

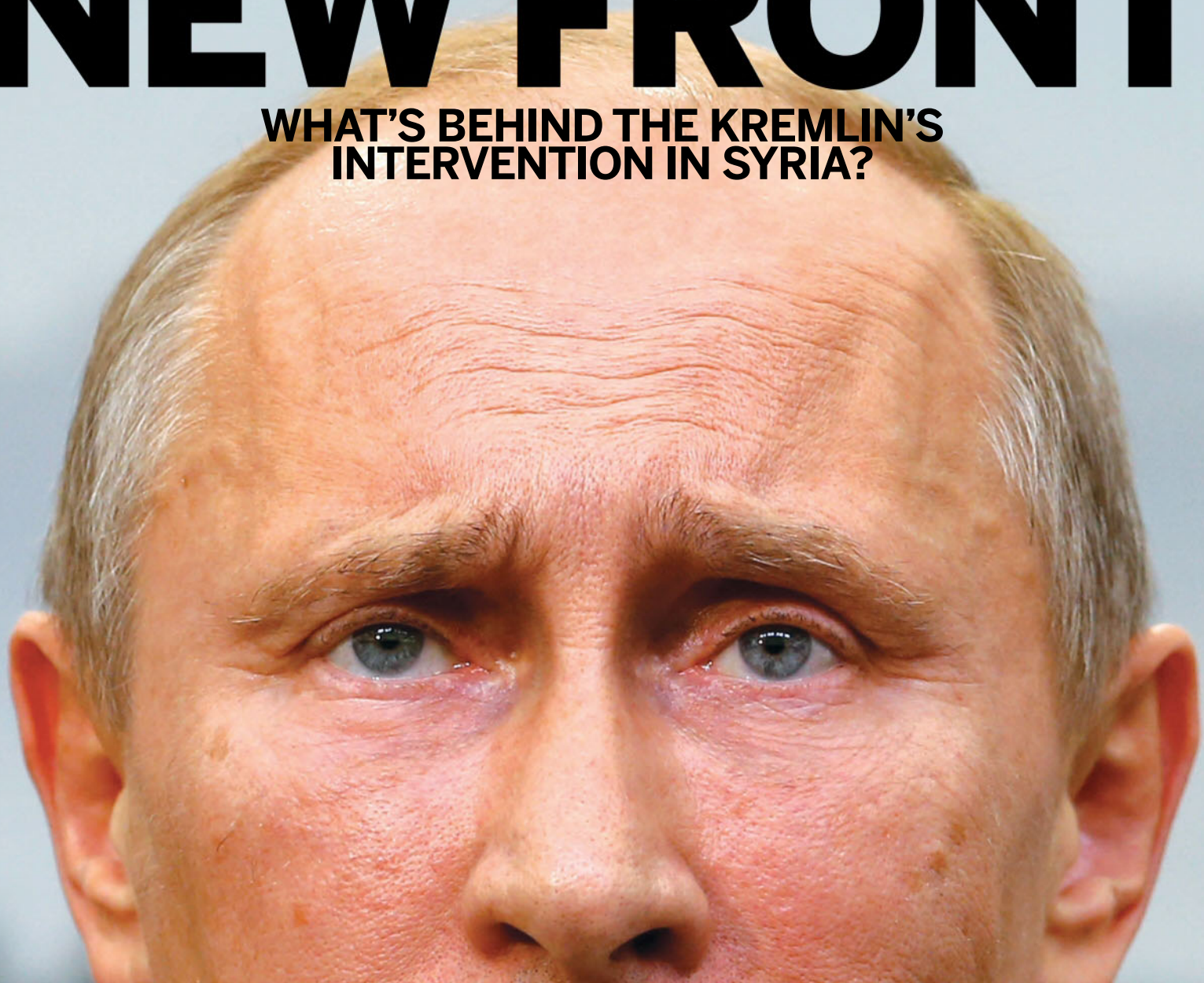
ISIS Money Woes / Saving the Ganges

**Newsweek**

02.10.2015

# PUTIN'S NEW FRONT

WHAT'S BEHIND THE KREMLIN'S  
INTERVENTION IN SYRIA?





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# Newsweek

OCTOBER 02, 2015 / VOL. 165 / NO. 12



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## BIG SHOTS

HUNGARY

### Border War

Roszke, Hungary—Hungarian riot police fire tear gas and use water cannons against people trying to cross the border from Serbia, as clashes break out and people throw rocks at the police, on September 16. Hungarian authorities had closed the border two days earlier to stem the flood of refugees and migrants. For months, thousands of people, mostly from Syria but also from Afghanistan, Iraq and parts of North Africa, have been fleeing to Europe to escape violence at home.



BORYANA KATSAROVA









## BURKINA FASO

**Coup  
du Jour**

Ouagadougou, Burkina Faso—Members of the presidential guard stormed a Cabinet meeting and seized Burkina Faso's president, Michel Kafando, in a coup less than a month before elections were due to be held. People took to the streets on September 17 after the coup, which was led by allies of former President Blaise Compaore, who was ousted last year. The military warned the presidential guard to back down, and on September 21 the Associated Press reported the general who led the coup said he would hand back power to a civilian government.



THEO RENAUT









CUBA

## Drive-by Pope

Havana—Pope Francis is given a warm welcome in Cuba after the Vatican helped bring about a thaw in relations between the Communist island and the United States. The pope met with President Raúl Castro as well as his brother Fidel. Dozens of dissidents were barred from Francis's Sunday Mass and detained by security agents, despite an invitation from the pontiff to attend.



CARL COURT











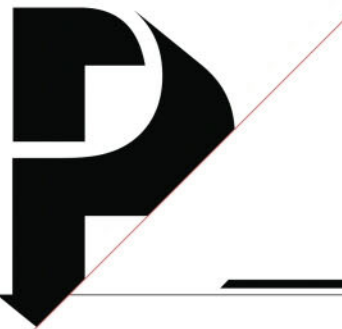


## JAPAN

**Fight for Right to Fight**

Tokyo—Lawmakers brawl in the Japanese parliament on Sas some opposition members try to block Yoshitake Konoike, chairman of an upper house committee on security, from a vote to approve bills that would allow the Japanese military to fight overseas for the first time since the end of World War II.

Despite massive street protests, the ruling Liberal Democratic Party and Clean Government Party passed the controversial bills, which they say are necessary to meet security threats from China, as well as to engage in peacekeeping operations abroad.



# P A G E O N E

ECONOMY

—SYRIA—

POLITICS

ISIS

REFUGEES

JAPAN

## PUTIN'S NEW FRONT

# Russia's recent military support of Syria is more about Ukraine than the Middle East

**RUSSIA'S** proxy war in Ukraine has brought President Vladimir Putin a lot of trouble, from sanctions that have damaged the Russian economy to awkward questions from mothers of soldiers killed in a conflict they are not officially fighting. But the Kremlin's latest gambit as it seeks an exit strategy in Ukraine is both bold and baffling. Doubling down on one secret war in Ukraine, the Kremlin has begun a second one—in Syria.

Over the past few weeks, U.S. intelligence has picked up ample evidence that Moscow is taking over a Syrian military air base south of the port of Latakia, defending it with Russian marines and at least seven T-90 tanks, plus artillery. According to Pentagon spokesman Captain Jeff Davis, "We have seen movement of people and things that would indicate that they plan to use the [Latakia airport] as a forward air operating base." At least two Russian transport planes a day have been flying tons of equipment into Latakia since September 8—including a new air traffic control tower and prefabricated hous-

ing units for up to 1,000 personnel. And in late August, the Russian Alligator-class large assault landing ship *Nikolai Filchenkov* passed the Strait of Bosphorus, heading in the direction of Russia's small naval base at Tartus, near Latakia, her decks crammed with canvas-covered cargo that looked to observers a lot like military vehicles.

At the same time, Syrian state television has aired images of an advanced Russian-built armored personnel carrier, the BTR-82A, in action against anti-government forces north of Latakia. Syria's ambassador to Moscow, Riad Haddad, insists that "talk of [Russian] troop presence on the Syrian territory is a lie spread by the United States." But videos have appeared on social media showing armed, uniformed men shouting orders to one another in Russian—as well as pictures of Russian marines standing in front of portraits of Putin and Syria's President Bashar Assad.

Russia has long supported the Assad regime diplomatically—supplying the beleaguered Syrian government with aircraft, helicopters, arms

BY  
**OWEN MATTHEWS**  
[@owenmatth](#)







**OLD FRIENDS:**  
Supporters of  
Assad sign a large  
Russian flag during  
a rally in Damas-  
cus in late 2011.  
Since then, Putin  
has been a reliable  
ally to the Syrian  
president.





and a Pantsir-S1 anti-aircraft missile system. But the arrival of substantial numbers of troops on the ground represents a major escalation in Russia's involvement in the Syrian conflict.

The question is, Why now? Assad's battle against his opponents has been a virtual stalemate since a bloody, and successful, spring assault to retake parts of Aleppo. U.S. and Turkish airstrikes on the Islamic State, also known as ISIS, haven't shown any sign of breaking the group's military power, though several key ISIS commanders have reportedly been killed by drone strikes and commando raids. So the most likely scenario is that Putin's Middle Eastern deployment has less to do with the military realities on the ground in Syria and everything to do with Russia's wider diplomatic game.

In late September, Putin will travel to New York for the first time in 10 years to address the United Nations General Assembly. It will be his first appearance there since the Russian annexation of Crimea last February and the war in eastern Ukraine that followed it, which resulted in the shooting down of Malaysia Airlines Flight MH-17 and draconian international sanctions against Russia. All indications are that Putin will use the speech to cast himself as a peacemaker in Syria—and in the process try to restore Russia's position

as a pillar of world security. He's also, according to spokesman Dmitry Peskov, going to address the issue of sanctions, which (along with sinking oil prices) caused the Russian economy to shrink by over 4 percent last year. Putin desperately needs the EU and U.S. to ease sanctions—and Foreign Minister Sergei Lavrov hinted in talks with U.S. Secretary of State John Kerry in Doha in August that Russia will trade cooperation in Syria for the scrapping of sanctions.

In some ways, a grand bargain based on what Lavrov calls a "broad anti-terrorist front" to counter ISIS could be a workable idea. "Despite our conflicts with Russia in areas like Ukraine, this is an area of potentially converging interests," President Barack Obama told an audience of U.S. servicemen and women in early September. Both Washington and Moscow want to crush ISIS and bring an end to Syria's agony. And both want to find a way to end the conflict in eastern Ukraine—which for Russia means a face-saving compromise that preserves some regional autonomy for the rebel Ukrainian regions Moscow has supported as they rejoin the rest of Ukraine.

But the major sticking point is over Russia's insistence that Assad remain as head of a rump state based in Latakia, the heartland of the minority Alawite sect to which the Assad clan

**LET'S MAKE A DEAL:** The Russian president wants to see sanctions eased and the crises in Ukraine and Syria brought to a close in a way that does not mean Russia loses face.





belongs. All the major powers in the region—most crucially Turkey and Saudi Arabia, as well as most of the Syrian opposition—insist that he cannot be part of a settlement. “The bad news is that Russia continues to believe that Assad, who is their traditional partner, is somebody worthy of continuing support,” said Obama. “We are going to be engaging Russia to let them know that you can’t continue to double down on a strategy that is doomed to fail.”

The kernel of Putin’s plan is to place Russia at the center of any Syrian settlement—an attempt to re-create the Soviet Union’s pivotal role in the region a generation ago. Russia’s troop deployment comes after a summer of intense but discreet diplomacy. In August, Moscow hosted Major General Qasem Soleimani, commander of the Iranian Revolutionary Guards’ Quds Force, who has been instrumental in organizing the chaotic security forces of neighboring Iraq to fight ISIS. Putin also met with King Abdullah of Jordan, President Abdel-Fattah el-Sissi of Egypt and Mohammed bin Zayed al-Nahyan, the crown prince of Abu Dhabi. At least three delegations from the Syrian opposition have also visited Moscow this year, according to a Russian Foreign Ministry source, and there is daily official contact with the Assad government. Assad has been busy too, sending his intelligence chief to Riyadh to talk to the Saudis and his foreign minister to Oman to try to rally support for a settlement that allows Assad to hold on to power in at least a small part of his country.

The aim of all these talks? Publicly, the Kremlin has been promoting the idea of creating a broad international coalition to fight ISIS. Privately, though, “the Russians are trying hard to drum up some kind of support, any kind of support, for Assad to hold on [to power],” says one senior European diplomat who has been working with Syria for over a decade. “But it’s a nonstarter. It’s pretty clear how the Syrian war will end: There will be some kind of rump Alawistan around Latakia ruled by former Baathists close to Assad...but certainly not Assad himself. The Kurds will have a self-governing area in the north—though the Turks will hate that. And the rest of the Sunni opposition, hopefully with ISIS droned and bombed out of existence, will be left to cobble together some kind of government in Damascus.”

Meanwhile, Moscow is also preparing for an endgame in eastern Ukraine. According to documents leaked to *The Times* of London by the

Security Service of Ukraine, “The Kremlin’s main priority now is to ‘return’ [the breakaway Donetsk and Lugansk People’s Republics] to Ukraine on Russian conditions.... This would maintain the territorial integrity of Ukraine and shift all the financial problems of restoring Donbass to Kiev while ensuring the government of the [rebel republics] remains under the control of the Russian special services.”

In recent weeks, Russia’s security services executed a mini coup in the rebel leadership of the Donetsk People’s Republic by removing some of the more intractable elements. The main victim has been Deputy Premier Andrei Purgin, an implacable opponent of rejoining Ukraine, who was arrested along with his wife earlier this month. Russia has also begun to build a giant military base on the Russian side of the border with Ukraine, suggesting that it has no intention of establishing bases inside the rebel territories.

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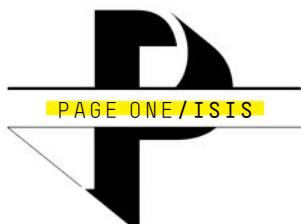
**“THE RUSSIANS ARE TRYING HARD TO DRUM UP SOME KIND OF SUPPORT, ANY KIND OF SUPPORT, FOR ASSAD TO HOLD ON [TO POWER].”**

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And while a recent poll by Moscow’s independent Levada Center showed overwhelming support for the annexation of Crimea, less than a quarter of Russians would support an all-out invasion of Ukraine to seize Donetsk and Lugansk.

Putin clearly has high hopes for his upcoming address to the U.N. General Assembly. He wants to put the Kremlin at the center of a non-U.S.-led regional coalition to attack ISIS. He is banking that engagement in Syria will help break Russia’s international isolation after the annexation of Crimea and enable the Kremlin to disengage from eastern Ukraine with pride intact. In short, Putin wants to make Russia a respected member of the world community once again. **N**





## CASH CRUNCH IN THE CALIPHATE

# ISIS faces growing resentment from its subjects as it focuses on keeping its war machine going

**WHEN THE** Islamic State, better known as ISIS, announced in June 2014 the formation in large parts of Iraq and Syria of a new Islamic state, or caliphate, the group made a promise to the people it now ruled over. “It is the state for the Muslims—the oppressed of them, the orphans, the widows and the impoverished,” said a spokesman for what now purported to be a government run on the precepts of Islamic law. “The people in the lands of the State move about for their livelihood and journeys, feeling safe regarding their lives and wealth.”

Celebrations erupted in the streets of the Syrian city of Raqqa, the de facto capital of the new Islamic state. Now, almost 15 months later, ISIS has bumped into a reality painfully familiar to any newly empowered government: It is a lot harder to keep promises, especially economic ones, than to make them. “ISIS said, ‘We know the poor, and will give them the money they need,’” says Sayf Saeed, a dental student who left the northern Iraqi city of Mosul for Baghdad in June because the Iraqi government would no longer recognize courses taught at the city’s university. “But instead, they use the money to buy weapons.”

A series of unforeseen events, including the fall in the price of oil and the intensification of U.S.-led airstrikes on oil facilities and fighters, has squeezed the group’s revenues and led it to rely increasingly on heavily taxing the estimated 8 million people living in the caliphate, say

experts and people living under ISIS’s control. The steady departure of professionals and the group’s restrictive laws on women in the workplace have also hobbled the ISIS-run economy. These factors have caused the income gap to widen between ISIS fighters and regular people in the lands the group controls. As inequality has grown, so too has the public’s resentment.

“People are struggling to pay the taxes, especially the financial penalties,” says a 30-year-old doctor who gave his name as Ahmed, speaking to *Newsweek* via email from Mosul, which ISIS seized from the Iraqi government on June 10, 2014. Ahmed (not his real name) uses a pseudonym because he now belongs to an anti-ISIS group called Mosulyoon and fears retribution. In Mosul, which had a population of around 2 million before ISIS took control, the cost of local government services—including health care, transport, water and electricity—has risen dramatically.

As winter approaches, the millions of people living in ISIS-controlled territory face rising food and fuel prices and frequent power cuts. “Before ISIS came, one liter of fuel was 30 cents; now it is \$2,” says Saeed. “A container of cooking gas was \$5; now it’s \$25.” In accordance with Islamic teachings, ISIS has implemented *zakat*, a charitable tax of 2.5 percent of income that all Muslims are obliged to pay. Contrary to its promises, ISIS does not distribute that money to the needy, Saeed says. In Raqqa, ISIS also appears to

BY  
**MIRREN GIDDA**  
[@MirrenGidda](#)



be uninterested in looking after the poor. “The only relief kitchen is run by locals,” says Abu Ibrahim al-Raqqawi, a former medical student and now founder of the activist group Raqqa Is Being Slaughtered Silently. Like Ahmed, he uses a pseudonym. Speaking to *Newsweek* via Skype from Raqqa, he says of the kitchen, “Every day there’s a line round the block. They give out one meal a day to the starving.”

As the caliphate’s poor get poorer, the fighters—who are increasingly from other countries—continue to enjoy comparatively comfortable standards of living. “I can see there are two different lives in Raqqa,” says al-Raqqawi. “The [foreign fighters] have become the residents, and the residents have become the foreigners.” Ordinary people, he adds, cannot afford to use the city’s fast-food joints, its restaurants or its Internet cafés. These places are almost exclusively used by ISIS fighters, who are not taxed on their salaries, according to al-Raqqawi.

“The foreign ISIS members are living in a luxurious Western lifestyle,” says Ahmed, describing the situation in Mosul. “They’re staying in the five-star Ninawa International Hotel or the villas of wealthy citizens who have fled. They

are also supplied with free medical services and unlimited electricity while other citizens get electricity for two hours a day only.”

Despite its decreasing revenues, ISIS continues to pay its fighters comparatively high salaries, peaking at \$1,000 a month for some foreign fighters, according to the U.S. Treasury. Based on these figures, the cost of paying ISIS fighters may

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“BEFORE ISIS CAME,  
ONE LITER OF FUEL WAS  
30 CENTS; NOW IT IS \$2.  
A CONTAINER OF COOKING  
GAS WAS \$5; NOW IT’S \$25.”

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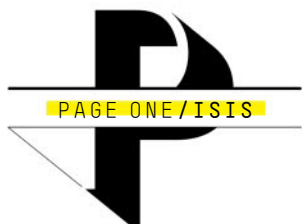
cost the group up to \$360 million per year. To put this in perspective, the Rand Corporation, a non-profit research organization based in California, estimated that in 2014 the group’s total earnings were \$1.2 billion. Of that total, \$500 million was a one-time windfall in the form of deposits stolen from Iraq’s state-owned banks.

ISIS’s high expenditure on salaries comes as

**OCCUPIED:** In ISIS-held cities like Mosul, right, heavy taxation, a ban on women doing most jobs and rising fuel prices are making it harder for residents to feed their families.







little surprise to Tom Keatinge, director of the Centre for Financial Crime and Security Studies at the Royal United Services Institute, a London-based defense and security think tank. “Supporting the ISIS machine is going to take priority,” he says. “If there are shortages, the fighters and the core of the regime will come first.” But, he adds, “they had plenty of money to start with, more than they needed, gathered from one-off seizures. The questions are: How much have they spent, how much do they earn now the one-offs have ceased? There’s no doubt that they will have been eating into their surplus.”

One group that could help the economy grow—the professional class—has been depleted. In cities like Raqqa and Mosul many educated people have packed up their families and moved to other parts of Syria or have become refugees. “The caliphate has been hit by a ‘brain drain,’” says Aymenn Jawad al-Tamimi, a fellow at the Middle East Forum, a Philadelphia-based organization that aims to promote U.S. interests in the Middle East. “Doctors have fled, and health services are very bad.”

And then there’s the impact of the extremists’ strict rules about women and work. Studies conducted by the U.N. and the International Monetary Fund show that including women in the workforce contributes to economic growth. But in the caliphate, women are only permitted to teach in girls’ schools, treat female patients in medical settings and work in stores selling feminine products. The rest stay at home. “My sisters are unable to work,” says al-Raqqawi. “It’s very hard to see them imprisoned in the house.” Plainly, this is not the state of equality and justice ISIS promised.

Its public financial pronouncements stretch credibility. At the start of the year, for example, ISIS announced a budget of \$2 billion to be spent on, among other things, wages for the poor, disabled and orphaned. Figures from the Iraqi government last year put the cost of maintaining public services in the Iraqi provinces that ISIS controls at well over \$2 billion alone. If both figures are accurate, that would leave ISIS with nothing budgeted for the territory it controls in Syria.

There are other signs ISIS may not have a particularly firm hand on its economy. On August 29, the group released an hourlong video announcing

the launch of its own currency. Titled *The Rise of the Khilafah: The Return of the Gold Dinar*, the video promised a currency based on the market value of precious metals that would “break the U.S. capitalist financial system of enslavement.” A month later, the group was still paying its salaries in U.S. dollars throughout the caliphate.

Do all of these challenges to the ISIS economic model guarantee the demise of the group or its system of government? Not necessarily, says Ben Bahney, an international policy analyst at Rand. “ISIS’s expenditure is quite low; it’s not really spending money on anything except for salaries. There’s not really any infrastructure—there were only one-off social programs. ISIS is happy to run a state that’s a lot like the Taliban’s rule of Afghanistan in the 1990s. This is mostly about implementing its version of the rule of law, which requires bodies and guns much more than bricks and mortar.”

Those living within the caliphate say they feel powerless, even as their resentment grows. “I don’t think the people of Mosul will ever rise against ISIS,” says Saeed. “What can they do? Western people should encourage their government to do more airstrikes to kill ISIS leadership. I want ground troops to come in and liberate Mosul.”

Bahney and al-Tamimi agree that the only way

## PAYING ITS FIGHTERS MAY COST ISIS UP TO \$360 MILLION PER YEAR.

to bring an end to the caliphate is to put boots on the ground, something that shows no sign of materializing. While Bahney says that this should be a slow, locally based movement of Kurdish and Iraqi forces, possibly backed by Syrian and Turkish troops, al-Tamimi thinks a Western or Pan-Arab force is needed. “But,” he adds, “there is no willpower for this with today’s dysfunctional politics and the legacy of the Iraq and Afghan wars.”

Cut off from the rest of the world, the residents of Mosul and Raqqa must prepare for a second hard winter under ISIS rule. The cold weather and the high prices of fuel and food will likely cause great misery. But while the group’s economy may be intrinsically flawed and battered by forces it can’t control, for the foreseeable future, the people most likely to feel the pain from the tax-and-spend jihadists are those who can least afford it. **N**



Number of  
people 100  
years or older  
in Japan,  
1963

TWO  
NUMBER

Number of  
people 100  
years or older  
in Japan,  
2015



## 100 Is Just a Number

JAPAN HAS A LOT OF REALLY, REALLY OLD PEOPLE

Getting old is getting old in Japan. The government has a tradition of presenting centenarians with the gift of a *sakazuki*, a silver sake cup, in the year they turn 100, but there are so many people hitting the milestone these days that the state is looking for a cheaper alternative.

In 1963, when Japan started keeping records on centenarians, there were 153 people aged 100 and over in the country. Five decades later, in 2015, 61,568 people are that old, according to the Japanese Ministry of Labor, Health and Welfare.

That is 0.048 percent of the population,

according to the U.N.'s Revision of World Population Prospects 2015 estimates, making Japan the country with the most centenarians per capita. The U.S. has more centenarians, 71,972, but that represents only 0.022 percent of the population. Puerto Rico, Guadeloupe, Italy and Martinique have the next highest concentrations.

As of 2013, Japan had the highest average life expectancy in the world. Just over a quarter of the population is aged 65 and over, according to the World Bank, and the government has warned an extra million care workers

must be found to cope with the aging population by 2025, when the share of people 65 and over is forecast to be 40 percent.

Ryuichi Kaneko, deputy director of Japan's National Institute of Population and Social Security Research, says that while there is no single decisive factor to explain the longevity of Japan's population, it can be attributed to dietary patterns, the country's universal health care system, an egalitarian society and a *raison d'être* among the elderly population, with many continuing to work after their official retirement.

The commemorative cups presented to Japan's centenarians are valued at approximately \$66. On September 15, Japan's Seniors' Day, the government sent the gift to 30,379 people at a cost of around \$2 million. Concerned about that rising cost, the health ministry already reduced the size of the cup in 2009 from 4 inches in diameter to 3.5 inches. The government is now considering making the cup out of a less expensive metal, although a tin cup seems too cruel a choice.

BY  
JACK MOORE  
@JFXM

SOURCE: JAPAN'S MINISTRY OF LABOR, HEALTH AND WELFARE



## B-B-B-BERNIE AND THE JETS

You know him as a grumpy socialist, but Vermonters know Bernie Sanders is also a pol who brings home the pork

AS BERNIE Sanders surges in Iowa and New Hampshire polls, many Americans are hearing the presidential candidate rage against “the billionaire class” for the first time. What they don’t know is what his fellow Vermonters know: The 74-year-old socialist seeking the Democratic nomination operates less like a rabble-rouser at home and more like most other U.S. senators: delivering services for veterans, Medicare for the elderly and defense spending for their state.

Vermont is tiny (pop. 620,000), overwhelmingly rural and white and heavily populated with migrants—including Sanders—who moved there from New York many years ago. On the back roads of the Northeast Kingdom, the most rural part of the state, aging hippies and their heirs still share tiny towns with fifth-generation loggers and dairy farmers. An unpaved road leads into Stannard (pop. 140), 45 minutes from the Canadian border, the town where Bernie arrived in the mid-1960s, after a childhood in Brooklyn, college in Chicago and a stint on a kibbutz.

In Stannard, Sanders was known as a serious reader who loved to talk politics. His funky house has changed ownership, but the community—named after a Union Army war hero—remains an outpost of ’60s-style idealism, including a large compost operation not far from the town hall owned and operated by a new generation of former New Yorkers. Stannard, like other towns in the state, has such a lively participatory de-



mocracy that, as Tom Gilbert, a local compost producer and farmer, puts it, “Vermonters all know their *Robert’s Rules*.”

Down the road, Sanders’s old neighbor Regina Troiano—like Sanders, a native New Yorker—still

BY  
**NINA BURLEIGH**  
[@ninaburleigh](https://twitter.com/ninaburleigh)



lives on the 175 acres she bought in 1972. When the senator swings through Stannard every year or two, Troiano hosts town meetings or fundraisers for him. The last time she saw Sanders, he pulled into her driveway in a Ford Fiesta carrying a church-hall-size coffee machine and bagels. “He’s incredibly generous,” she says. “He’s always making sure everyone gets enough—to eat.”

Sanders left Stannard in the late 1970s and won his first election in 1981, becoming the mayor of Burlington, the state’s largest city, with just 42,000 residents. Sanders slipped into office by just 12 votes but was re-elected four times as he gained a reputation as a pragmatist whose improvements transformed the city. Despite jokes about the People’s Republic of Burlington, Mayor Sanders created a Community and Economic Development Office that had some progressive aspirations like promoting affordable housing, but it also worked with local businesses. The mayor’s office took on a derelict industrial area near the shore of Lake Champlain. After voters rejected a bond referendum to develop the waterfront, Sanders’s office dusted off a Vermont public trust doctrine from the 19th century that allowed the city to buy the land for a fraction of the price that private developers would have had to pay. Since the bond issue had failed, the city made relatively inexpensive improvements—removing barbed wire, oil tanks and other industrial waste and transforming the railroad tracks into a paved bike path—and then invited developers back into the now beautified area. Today, it’s the well-regarded, tourist-friendly Waterfront Park.

“[The city] created all the infrastructure,” says Melinda Moulton, CEO of Main Street Landing, a redevelopment company involved with the Waterfront who hails Sanders as a politician who helped businesses in Vermont behave in socially conscious ways.

As mayor, Sanders developed other passionate business supporters, including Ben Cohen, the Ben in Ben & Jerry’s ice cream, who has been opening for the senator at presidential campaign stump speeches. Cohen no longer makes ice cream. He sold his eponymous company to British-Dutch mega-corporation Unilever in 2001—which makes it the rare corporate merger Sanders doesn’t decry. Cohen says he’d like to name an ice cream after the progressive hero—“Bernie’s Binge,” a concoction with a large chunk of *rich* chocolate in the center that needs to be broken up with a spoon.

Sanders ran for Congress in 1990 as an independent and won. He was an intriguing pro-business socialist, and he also got a big lift from the gun control issue, but not in the way you might think. When his moderate Republican opponent endorsed an assault weapons ban, Sanders stayed quiet. Steven Rosenfeld, who worked with Sanders on that race and wrote a book about the experience, says Sanders didn’t need to have it explained to him that “being against guns in Vermont is like being against black and white cows.”

Like everyone running for the Democratic presidential nomination this year, Sanders favors stricter gun control. But he tempers his stance in a way that plays well at home. In 2005, he supported a bill protecting gun sellers from lawsuits by survivors of gun violence. Asked this year whether he regrets preventing Aurora, Colorado, theater victims from suing local gun retailer Lucky Gunner, where convicted shooter James Holmes allegedly

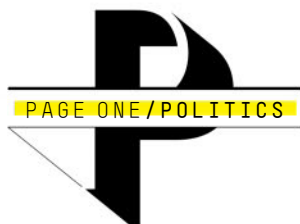
## IN WASHINGTON FOR 25 YEARS, SANDERS PROVED HE’S A SKILLED LAWMAKER ABLE TO CUT DEALS ACROSS THE POLITICAL SPECTRUM.

bought weapons, Sanders told CNN that nobody holds hammer distributors liable. “That is not what a lawsuit should be about,” he said, adding that “99.9 percent of gun owners obey the law.” It’s little wonder that a super PAC supporting rival Democratic presidential candidate Martin O’Malley has already run an ad declaring that “Bernie Sanders is no progressive when it comes to guns.”

Navigating divisive cultural issues like guns has been a Sanders mainstay. On the presidential campaign stump, he bellows, “I will *never* understand why middle-class and blue-collar Republicans continue to vote against their own interests!” The line is a guaranteed crowd-pleaser, and, in fact, Sanders, who won re-election to the U.S. Senate in 2012 with 71 percent of the vote, knows how to spur these swing voters that Democrats crave. His coalition of NPR-listening, pro-gay marriage, pro-choice progressives, along with gun-toting, maple-sugar-tapping lumberjacks, is quite a feat. Flatlanders (as the newer, liberal-minded Vermonters are commonly known) and Woodchucks (their hunting- and tradition-minded natives) had a period of open warfare in 2000, when many







Woodchucks were furious about Vermont legalizing gay civil unions and restricting the clear-cutting of woodlands. But even then, pickup trucks with gun racks sported “Take Back Vermont” stickers beside “Bernie” stickers.

When Sanders ran for the Senate in 2006, Senator Patrick Leahy—the only Democrat Vermonters have ever sent there—noted Sanders’s cross-party appeal. “A lot of the lower-income parts of our state are Republican,” Leahy told *The New York Times*. “I saw Bernie signs all over those parts of the state.” (For more about Bernie in Vermont, the Burlington independent weekly *Seven Days* has compiled an online library going back decades, called BernieBeat.)

In Washington for almost 25 years, Sanders has operated like any other member who brings home the bacon. As chairman of the Senate Veterans Affairs’ committee, Sanders has proved himself a skilled lawmaker able to cut deals across the political spectrum. He and John McCain won \$500 million for the Veterans Affairs department to hire more doctors and lease medical facilities to expand VA services. Through his efforts, Vermont snagged more federally funded community health centers per capita than any other state. The VA placed the nation’s pre-eminent treatment center for post-traumatic stress disorder in White River Junction, and he obtained \$135 million in federal flooding funds after 2011’s Hurricane Irene.

Vermont’s lone congressman, Democrat Peter Welch, credits Sanders for his focus on “concrete things” like getting significant funds for satellite VA clinics around the state so rural vets don’t have to drive hours to get care, and bringing in civilian community health centers that are federally funded. “He is primarily known as an advocate for the underdog,” Welch says. “He’s the guy who’s gonna be standing up and calling it out on behalf of everyday people.”

As he sipped tea and sucked on herbal throat lozenges in August while campaigning in New Hampshire, Sanders reflected on his constituent work. “You can give all the great speeches you want on the floor,” he told *Newsweek*, referring to the Senate floor like someone who has spent a quarter century in the Capitol. “But there are people who aren’t getting their vet-

erans benefits, and I’ll be damned if my office is not going to do everything they can to make sure they get those benefits.”

When it comes to defense, Sanders is also politically adroit. He voted against the Iraq War, a position that, among others, makes him a hero to the left. But he isn’t averse to delivering Pentagon pork. After years of publicly attacking defense contractor Lockheed Martin for cost overruns and overpaid executives, he persuaded the defense behemoth, which manages the Sandia Labs research center for the Department of Energy, to place a Sandia satellite lab in Burlington. Even more lucrative for Vermont, Sanders snagged a piece of Lockheed’s F-35 Joint Strike Fighter program—a controversial \$1.5 trillion program yielding the most expensive aircraft in history. Eighteen of the jets will be placed at the Burlington airport for the Vermont National Guard.

There’s some resistance to Bernie from the left in Vermont. Chris Schroth, 28, a musician and carpenter, says he is skeptical of Sanders’s commitment to what he dubs “a conscious people’s movement.” He also says Sanders did not do enough to support Act 48, which would have made Vermont

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## “BEING AGAINST GUNS IN VERMONT IS LIKE BEING AGAINST BLACK AND WHITE COWS.”

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the first state with a single-payer health system. “Bernie was holding town halls talking about national health care, but he wasn’t lifting up the local movement,” Schroth laments. Instead of grabbing a pitchfork and joining the fight, Sanders demurred. “Well, 24 hours a day, seven days a week, I’m kinda busy being a United States senator,” he says. “I’m not the governor of the state.”

If this kind of political pragmatism from a non-traditional candidate sounds familiar, it should. Progressives once saw Barack Obama as the Moses of “hope and change.” He also surprised pundits with huge crowds and gave Hillary Clinton ulcers. After the 2008 election, Obama’s base discovered a politician who appointed establishment mascot Larry Summers as treasury secretary, expanded drone strikes and opened the Arctic to oil drilling. Like the president who once presented himself as an audaciously new sort of politician, Sanders plays well by the old rules of the game. ■



## Names in the News

UP, DOWN AND SIDEWAYS

[@WisdomWatch](#)



### POPE FRANCIS

 Vatican announces that during pontiff's weeklong visit to U.S., he will deliver most of his speeches in Spanish, language of his native Argentina. Republican candidates debate the point: Trump demands he speak English, Bush requests a big dose of Latin, and Huckabee suggests he speak in tongues.

### SUPERFICIAL VALUES

 Pressure to look cool and have latest stuff bad for well-being of kids. In U.K. study, consumer and fashion culture found to worsen relationships. Life as a plastic not so fantastic.



### PLATTERS

 Record manufacturers are scrambling to keep up with highest demand for vinyl industry has seen in 25 years, rehabbing old and often neglected equipment. My, how the turntables have turned.



### TRUMP

 You're fired! You're hired! NBC will be replacing The Donald as host of *Celebrity Apprentice* with actor (and two-time California governor) Arnold Schwarzenegger. Your hair—give it to me, now!



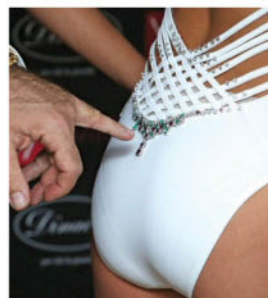
### CAFFEINE

 Residue found on 1,000-year-old pottery in dig suggests coffee. In related news, Native American artifact from Southwest inscribed with mysterious markings, thought to translate to "World's No. 1 Dad."



### DIAMONDS

 Doctor in Bangkok removes stolen diamond valued at over \$270,000 from thief's large intestine with pliers after dose of laxatives fail to get results. Whole new meaning to "first-class seating."





An aerial photograph of a village nestled in a valley, surrounded by steep, forested mountains. The village features a mix of traditional and modern buildings, with a prominent red-roofed structure. The surrounding landscape is characterized by terraced fields in shades of green and yellow. The sky is filled with large, white, billowing clouds.

INDIA'S FUTURE  
DEPENDS ON REVIVING  
THE GANGES RIVER

# THE RIVER



An aerial photograph of a river valley. A large dam with multiple spillways is visible in the foreground, holding back a reservoir. The river flows through a valley with terraced fields and a town. The background shows steep, forested mountains under a cloudy sky. The title 'OF DEATH' is overlaid in large white letters, with 'OF' in a smaller font and 'DEATH' in a larger font. The letters are partially obscured by pink horizontal bars.

# OF DEATH



BY CAMERON CONAWAY  
(@CAMERONCONAWAY)



# ONE DAY IN JANUARY 2015, BLACK CROWS BEGAN TO FILL THE GRAY SKY LIKE WILD BRUSHSTROKES,

so a group of villagers decided to investigate. The birds were circling something, and as the villagers approached they heard the guttural growl of dogs, all teeth and rib cage, scrapping for the last tug of tendon. That's when they found a floating mass grave of more than 100 corpses washed up in a canal that connects to the Ganges River.

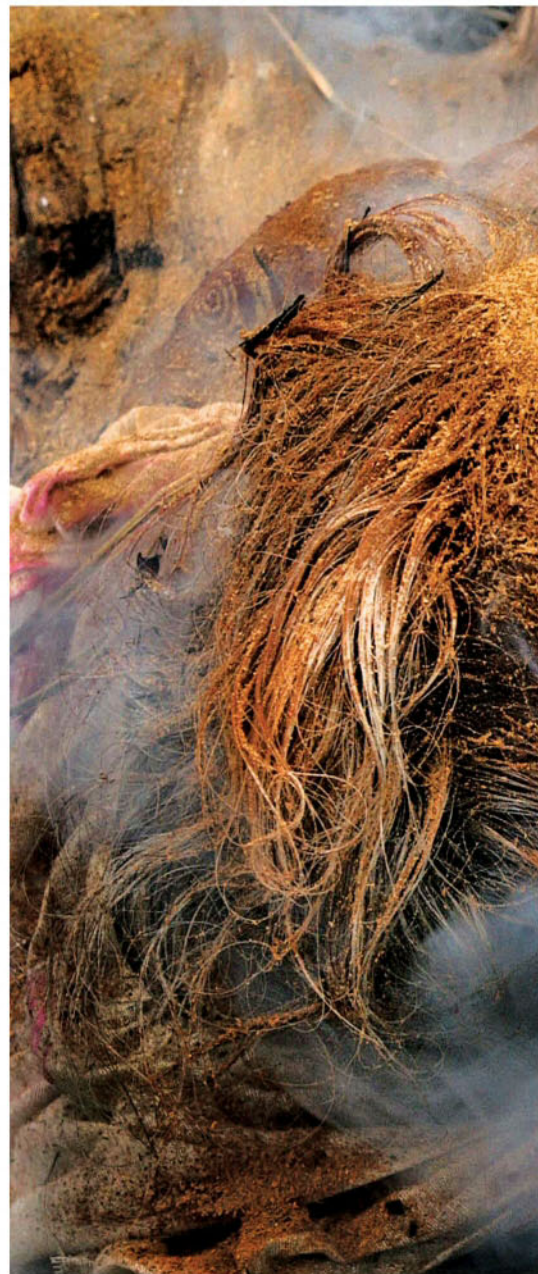
The macabre event lent itself well to sensationalization; each headline that came out in the week following ferried me back to June 2013, when Raghvendra "Nandan" Upadhyay, a local journalist and tour guide, greeted me before leading me through his hometown by saying: "Welcome to the city of learning and burning, of light and death. Welcome to Varanasi."

Situated on the west bank of the Ganges River—referred to in Hindi as *Ma Ganga* (Mother Ganga), or simply Ganga—in the Indian state of Uttar Pradesh, Varanasi is India's oldest city and thought to be one of the oldest continuously inhabited cities in the world. Mark Twain, upon visiting in the 1890s, quipped that it's "older than history, older than tradition, older even than legend, and looks twice as old as all of them put together!"

Varanasi is also the religious capital of India and Hinduism. "Millions of Hindus want to die or at least have their ashes spread in the Ganges here," said Nandan. "In doing so, they believe they can break the perpetual cycle of *samsara*, of birth and rebirth, and thus achieve *moksha*, eternal liberation."

That's why dead bodies are burning 24 hours a day there, seven days a week. "This same fire has been going for 3,000 years," said a worker at Manikarnika Ghat, the most famous riverside cremation site in Varanasi. "We average anywhere from 30 to 100 bodies per day. Each takes about three hours." The corpses are covered in ghee (clarified butter), laid atop wooden planks, layered with ornate cloth, briefly dipped in the Ganges and then carried to the open-air pit and lit aflame.


Death is big business here. There are hotels, such as Kashi Labh Mukti Bhavan, that accept only occupants expected to die within 15 days. And according to Uttar Pradesh's official data, tourism is on the rise, with thousands coming every month to watch this theater of death along the



Ganges. And while workers at Manikarnika Ghat will tell you that families can pay "based on means," there is immense pressure to buy the right kind of wood for these cremations (sandalwood, for example, offers a better burn and therefore, it is believed, means a better shot at *moksha*). In the end, a body can cost a family 7,000 Indian rupees (\$109) to burn—over 15 percent of the average Indian's yearly wage.

It's why many families deposit their recently deceased directly into the Ganges or into a channel that will lead to it. Liberating the soul of a loved one is worth running the risk that the body ends up





**ASH WEDNESDAY...  
AND THURSDAY...**  
Thousands of bodies like this one are cremated each day, and then the ashes are dumped into the Ganges.

## **“WELCOME TO THE CITY OF LEARNING AND BURNING, OF LIGHT AND DEATH.”**

being picked apart by carrion birds and wild dogs. The problem, really, is when the scavenging animals don't come, and the bodies are left to rot in the river.

### **POLLUTION TOURISM**

**X**

“**ALL OF THIS,**” Nandan said as we watched the funeral rituals from our rowboat, “the economics, the ritual,

the history, the bodies burned or simply dumped, the families over there bathing to wash away their sins, all of this is because of my country's deep belief in Ganga. Respect for Ganga is what truly unites India.”

The infamously polluted body of water begins in the Himalayan town of Devprayag and winds throughout the country for over 1,500 miles before draining into the Bay of Bengal. The Ganges River basin, according to Colorado State University fluvial geoscientist Ellen Wohl, supports a staggering 10 percent of the world's population. This includes all ways in which the water is used for survival: for growing rice and other crops, bathing, drinking, providing fish and other animals as a food source, and more.

The mythological story of Ganga the self-cleaning river god—she lived





in heaven but chose to live on earth to purify the sins of all those she came in contact with—fuels countless festivals and holidays in India. Tragically, though, it's often respect for Ganga the god that leads to disrespect for Ganges the river.

As I sat in the boat with Nandan that morning, I wasn't struck so much by the burning bodies as by how, in water just a few feet from floating corpses, young boys rinsed their mouths and spat the water high into the air. Yogis and meditators devoted their morning service to worshipping Ganga, but in the afternoon were throwing their candy bar wrappers and plastic bottles into it.

Thousands joined in the Ganga Aarti festival, a spiritual gathering that happens every day at dusk for worshippers to receive Ganga's blessing. And that's when I realized how bad things really were: The celebratory rituals used

to laud the Ganga involve poisoning her.

We were packed in so tight to watch the Ganga Aarti performances that I could see only a few inches of the river in the spaces between the rowboats. This was the space that served as receptacle: I watched as people stuffed these gaps with their cigarettes and cigarette boxes, empty juice containers, receipts—whatever they wanted to get rid of ended up in the Ganges. It was as though we weren't on water but instead on some

FROM LEFT: RAJESH KUMAR SINGH/AP;  
DANISH SIDDIQUI/REUTERS





**LAST STOP:** Many Hindus believe that if they have their ashes dumped in the river at Varanasi, they skip a life and death cycle, and earn a shortcut to salvation.

kind of swaying land of trash.

What's flowing beneath the surface is much worse: Millions of gallons of industrial effluents and raw sewage drain into the Ganges each day. The results are devastating. Diarrhea, often caused by exposure to fecal matter, kills 600,000 Indians per year,

and waterborne diseases throughout the Ganges River basin, many a result of the polluted waters, cost families \$4 billion per year. Sanitation and water pollution issues cause 80 percent of the diseases that afflict rural Indians.

The pollution has also slowed down or made stagnant many once free-flowing areas of the Ganges. Stagnation is where the mosquitos thrive, and with mosquitos comes malaria. The deadliest form of malaria, *Plasmodium falciparum*, is on the rise in India, and the worst may be yet to come: Dr. François H. Nosten of the Shoklo Malaria Research Unit in Thailand

## THE GANGES RIVER BASIN SUPPORTS A STAGGERING 10 PERCENT OF THE WORLD'S POPULATION.

believes the drug-resistant strain of the disease-causing parasite his team is struggling to combat in Southeast Asia is "bound to spill over into India." This form of malaria is perhaps the world's most pressing global health issue, and if India cannot clean up the Ganges the country could be setting itself up for a catastrophe. And this is to say nothing of dengue, which is endemic all over India, and of chikungunya, a viral disease of which India has had several outbreaks in the past few years.

The pollution has become so grotesque that in May of this year my taxi driver in Delhi went through a list of places I could visit, and after mentioning World Heritage Sites like the Red Fort and Humayun's Tomb, he suggested I go see "Yamuna foam," the toxic foam of chemicals and urine coating large swaths of Delhi's portion of the Yamuna River, the largest tributary of the Ganges. Tourists in India's big cities now flock to see how bad the country's waterways have become, while up and down the river, things are only getting worse.







## TOXIC BENDS



**THERE'S A WIDESPREAD BELIEF** that the destitute people living along the river destroy it the most. But Sonali Mittra, of the Delhi-based Observer Research Foundation, a nonprofit think tank involved in regional and transboundary resource management of water, says the data do not bear this out. "The poor or vulnerable river communities are often viewed as the major polluters," she says, "but much research indicates that it is industries and urban centers who are more responsible."

Follow the Ganges along its winding route from the Himalayas to the Bay of Bengal, and you'll encounter a veritable catalog of these pollution types. Haridwar is about 60 miles southwest of Devprayag. It's regarded as one of the seven holy places for Hindus, and it's here where the Ganges enters the plains of Northern India. It's also where, on May 23, 2015, the Radisson Blu hotel had its utilities shut off for about 36 hours by the State Pollution Control Board (SPCB) after it was caught dumping untreated water from its drains into the Ganges.

Many viewed the actions taken against the Radisson as heartening evidence of Prime Minister Narendra Modi's passion to clean the Ganges. Maybe, they said, his Cabinet's declaration of 2015-2016 as Jal Kranti Varsh, or Water Revolution Year, was more than just a clever political move. Uma Bharti, Modi's "Ganga rejuvenation minister," has even set a goal that the Ganges will be clean within two years.

SPCB regional officer Ankur Kansal told *The Times of India*, "We have

made it very clear to them that untreated water flowing into the Ganga will not be tolerated." But a hotel manager, who asked to remain anonymous for fear of damaging the Radisson's relationship with government regulators, tells me that after dealing with the SPCB for four years, he is confident that the hotel "will not receive any fine" and "will not receive any sanctions."

Kanpur is 320 miles southeast of Haridwar. It's a major industrialized city where, according to Murali Prasad Pant at the Indian Institute of Technology Kanpur, "Nearly 70 percent of the people who use Ganga's waters will become sickened by waterborne diseases caused by the sewage upstream."

Kanpur's dirty little secret is its underground cow-slaughtering market. Reverence for the cow is found in nearly all of Hinduism's major texts. For the most part, people treat them as pets that provide milk, and generally beef isn't eaten in India. But when the sun sets in



Kanpur, the silent slaughtering begins. Despite the countrywide respect for cows and the laws in some regions that carry a seven-year prison term for those caught killing them, India is home to an estimated 3,100 illegal slaughterhouses that export cow meat under the guise of buffalo meat to hide the sacrilege. The country is also the world's largest exporter of leather. Kanpur, known as the "Leather City of the World," is at the center of this lucrative industry.

There are 700 tanneries on the banks of the Ganges here, many pumping dangerous levels of sulfuric acid, chromium, arsenic and mercury into the river. According to India's National Green Tribunal, these tanneries are one of the worst sources of pollution to the Ganges; cancer rates are higher in these areas, and it's believed that many children have gone blind as a result of the industry.

**PURIFIED:** Nearly 10 million Hindus bathe in the river during the annual Kumbh Mela Festival, left, believing that it will cleanse them of their sins.

## "PEOPLE WILL STARVE THEMSELVES TO BUY FLOWERS TO OFFER GANGA."

"In Kanpur, the river is effectively dead," says Rakesh Jaiswal, an Ashoka Fellow and environmental activist. "No one ever thought this would happen. This is the water we believe holy, yet we remain silent at its desecration."

### TOILETS BEFORE TEMPLES

X

— **ABOUT 1,100 MILES** from Kanpur, in the state of West Bengal, is Sagar Island, where the Ganges drains into the Bay of Bengal. Millions of Hindus make the pilgrimage here at least once in their lifetime to pay respect to Ganga before she makes her way into the ocean. This is especially true during the Gangasagar Mela, an event in mid-January to celebrate Ganga's descent from heaven. It's one of the largest annual gatherings in the world, and well over 500,000 Hindus dip themselves in the water to purify their souls.

It's one of the area's main sources of income. But it's also devastating for the environment. "The load of human waste in Gangasagar Mela is colossal with so many people defecating and bathing within three days on a four-square-kilometer stretch," Tuhin Ghosh, a researcher at the School of Oceanographic Studies at Jadavpur University, told the *Times of India*. "The carrying capacity of Sagar Island is exceeded several thousand times during





this brief period, and the resultant pollution causes environmental degradation. Each Mela pushes environmental parameters closer to the brink.”

These problems will only continue to worsen. India's population is growing. With it, water needs are skyrocketing: The International Water Management Institute estimates that water demand in the country will increase 32 percent by 2050. And though India is in the midst of a tech revolution, bolstered by a population set to surpass China by 2028 and developments such as its impressive space program, there has been little investment in technology to save the country's 5,219 miles of water that are, according to environmental journalist Chetan Chauhan of *Hindustan Times*, “not fit to support aquatic life” due to pollution. The water is so bad that the International Union for the Conservation of Nature declared the Ganges-swimming India river dolphin, the country's official national aquatic animal, as functionally extinct in 2007.

## WHILE 45 PERCENT OF INDIANS HAVE A CELLPHONE, ONLY 31 PERCENT HAD A TOILET.

There are some signs that things might be improving. There are now some radical cleanup efforts underway using innovative machines such as the floating trash skimmer made by Cleantec Infra. The skimmer moves through the use of two basic paddle wheels, and its two hydraulic gates pull trash onto a conveyor belt. Namami Gange, a government-led water conservation mission, has used the machine during celebratory events involving millions of Indians, and efforts are underway to continue advancing upon this technology.

Professor B.D. Tripathi of Banaras Hindu University pioneered Ganga pollution research initiatives in the early '70s and has been studying the river's decline ever since. So it's reassuring that he is filled with hope. “Modi is the first prime minister of India who has shown his dedication for Mother Ganga and created a separate ministry for its rejuvenation,” he says. “I hope he will succeed in his efforts. Over 450 million people rely on the Ganga. Saving the Ganga is the saving of humanity.”

When Modi took office in May 2014, he famously thanked two mothers. In Gandhinagar, the capital of the state of Gujarat in Western India, he thanked his mother, Heeraben Modi. After receiving her blessings, he traveled nearly 900 miles east to Varanasi and along the banks where 96 percent consider the water unsafe to drink, he thanked the Ganges for its strength. With that, he claimed he would clean the river by October 2019, the 150th anniversary of Mahatma Gandhi's birth.

He's also sticking to the “toilets before temples” mantra that he's repeated on the national stage since his election. There are 600 million people in India who don't use toilets, and much of that human waste ends up in the river; a U.N. report in 2010 revealed that while 45 percent of Indians had a cellphone, only 31 percent had a toilet. But in July of this year, Modi promised there would be toilets in every school throughout India within the next few months.

### FAITH HEALING

X

**ABOVE ALL ELSE**, though, the country needs to come to terms with the fact that, as Mittra puts it, “the mythological idea of the Ganga is indeed more valued than the river itself.”



Sadhvi “Sadhviji” Bhagawati Saraswati of the nonprofit Ganga Action Parivar, a nonprofit organization based in Rishikesh, believes that the way to do this is to form “a collaboration that involves the government and scientists, but also faith leaders who have the networks and the capacity to shape perspective through story rather than shaming.” Many nongovernmental organizations and others hoping to save the Ganges have ignored the cultural influence of Ganga myths, seeing the pollution as a matter of the people not caring about it. But understanding the impact of religion is key.

“People will starve themselves. They will skip meals to save rupees and use those rupees to buy flowers to offer Ganga,” Sadhviji says. “But in offering those flowers, they also offer the plastic bag they're wrapped in.” That's why saving the Ganges is not about convincing people to care, it's about convincing them to care differently. “For thousands of years, people have believed Ganga can wash away a lifetime of sins. Why on earth would they suddenly believe their garbage could harm her? Many people actually feel disrespected when such an idea is presented,” Sadhviji says. She

FROM LEFT: PRESS TRUST OF INDIA/AP; DANNISH SIDDIQUE/REUTERS





says it will take local faith leaders to effectively convince them otherwise.

Ganga Action Parivar tries to wrap informed messages about environmental conservation into religion and its myths. “Hinduism is inextricably linked to caring for animals, plants and the natural world,” Sadhviji says. “When the pollution conversation is shaped in this manner, people immediately realize the way their actions go against their deepest values. This is when they change.”

In 2015, I visited the city of Rishikesh in the lap of the Himalayas just in time to celebrate the Ganga Dussehra, a countrywide recognition of the exact day Ganga came down from heaven to earth. Rishikesh is known for being “the yoga capital of the world” and for hosting the Beatles in 1968 during their transcendental meditation retreat at the ashram of Maharishi Mahesh Yogi. It’s also where many Indians told me to visit if I wanted to see Ganga at her finest.

In Rishikesh, the Ganges is shockingly clean; while in water up to my knees, I could still see my feet. Perhaps a better indicator is that I didn’t see a single piece of trash during the 30 minutes I spent meditating along the banks. So at 4 in the morning on the following day, with thousands of others, I celebrated Ganga and for the first time plunged my entire body into her waters. **N**

*Cameron Conaway’s reporting on the Ganges River was supported by a grant from the Pulitzer Center on Crisis Reporting.*



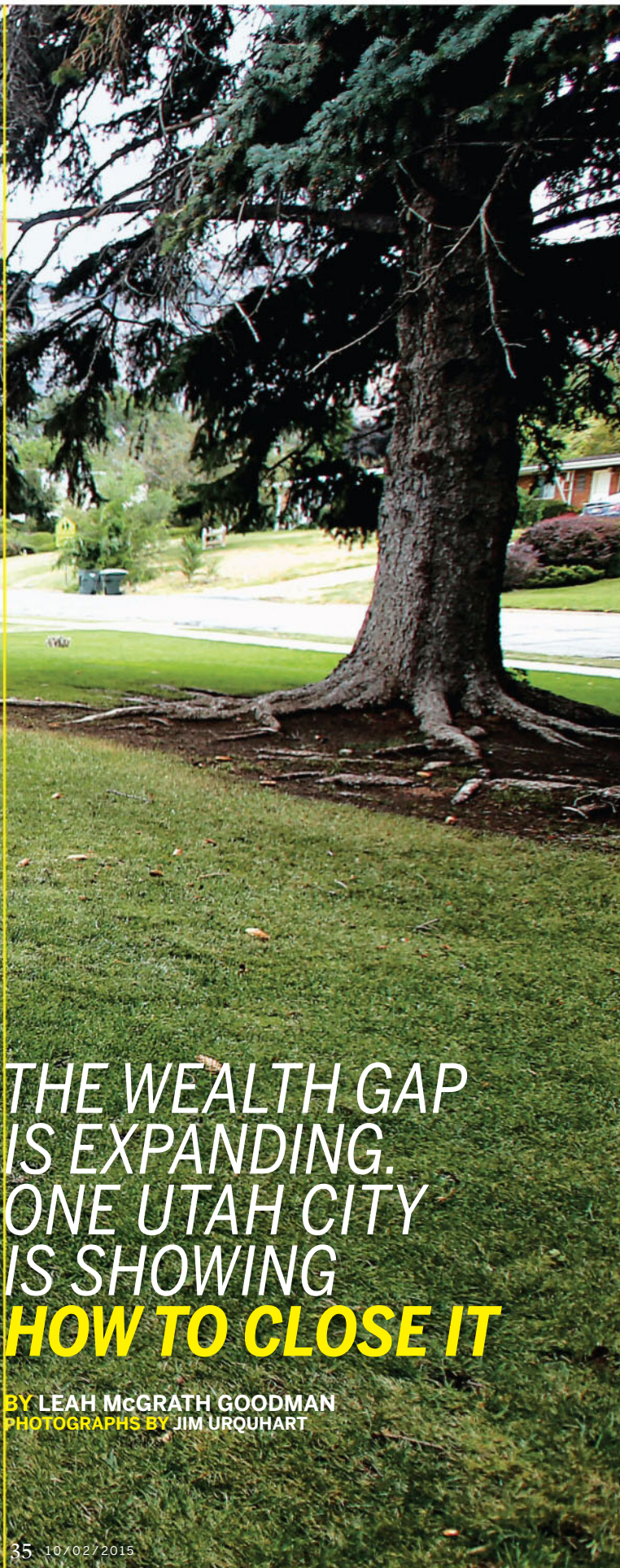
**FLOATING CEMETERY:** Bodies dumped in the Ganges have to be hauled out downriver, unless they have been picked clean by carrion birds and wild dogs.



AND  
EQUALITY  
FOR  
REALLY  
**VERY  
FEW**







THE WEALTH GAP  
IS EXPANDING.  
▶ ONE UTAH CITY  
IS SHOWING  
**HOW TO CLOSE IT**

BY LEAH McGRATH GOODMAN  
PHOTOGRAPHS BY JIM URQUHART



# TOM CHRISTOPULOS STEERS A BLACK NISSAN ARMADA THROUGH THE SHARPLY ANGLED STREETS OF OGDEN, UTAH,

a historic metropolis about 35 miles north of Salt Lake City lodged at the base of the towering Wasatch Mountains, dissecting the neighborhoods home by home and crunching the numbers out loud. As part of his drive-by, he canvasses the terrain voraciously, even compulsively, visually cataloguing every detail—a rite he’s performed for nearly a decade. “I know every block in this town, every house,” he says. “See those mansions over there on Jefferson Avenue? They were cut up long ago, turned into rentals—flopouses, really. We bought them up, renovated them and turned them back into single-family homes.”

Born and reared in Ogden, Christopulos has labored for the past eight years as the town’s director of community and economic development, squeezing prosperity—slowly and painstakingly—from abandoned rail yards, slaughterhouses and run-down buildings in an effort to rebuild Ogden’s middle class. “It’s been real pick-and-ax work,” he says.

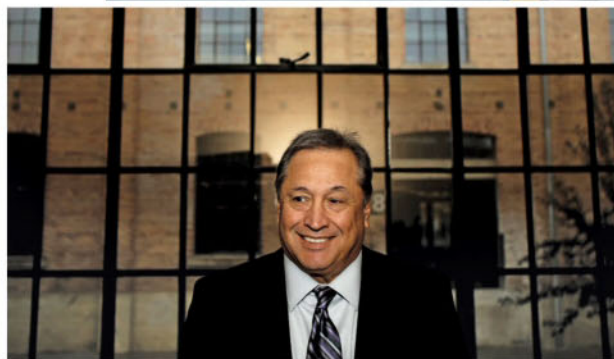
Today, Ogden, with a population of roughly 86,000, boasts a distinction that has put it on the national radar: At a time when the United States—along with much of the rest of the world—is grappling with the pernicious effects of ever-widening wealth inequality, Ogden has become an unlikely beacon of egalitarianism. The city, together with its neighboring communities, has the narrowest wealth gap among America’s largest metropolitan statistical areas, according to the U.S. Census Bureau’s five-year American Community Survey.

But just over a decade ago, the future here looked bleak. Ogden’s main streets were deserted, its shopping districts lay in ruins, and vagrants roamed downtown, peddling drugs. An online message board from 2009 decried Ogden’s urban wasteland and reputation for being “a low-class gang-infested area,” adding despairingly: “Sadly, the Ogden mentality is so deep-rooted” that any efforts to revitalize the town were opposed, and “pursuit of change has offended” many.

Driving this past summer with Christopulos and his economic team, one could not help but be awed by the beauty of this stretch of land at the western edge of the greater Rocky Mountains. Yet just before us were dilapidated rail tracks, a harsh reminder of the city’s glorious commercial past. These days, steel-and-glass aeries rise from the rusting, crumbling infrastructure, punctuating the prosperous present landscape. The story of how Ogden got here is a valuable lesson for a country struggling to bridge the chasm between haves and have-nots.



**RISE AND FALL:** Born and raised in Ogden, Tom Christopulos (below) remembers when it was a thriving railroad town in the 1960s. By the late 1990s, businesses had shut down and the city was in dire straits.



## ‘THE DEFINING ISSUE OF OUR TIME’

**OVER THE PAST** several years, renowned libertarian and former Federal Reserve chief Alan Greenspan, outspoken billionaire Warren Buffett and presidential candidates have come to the same conclusion: Ordinary Americans are no longer getting a fair shake. In the aftermath of the 2008 financial crisis, Greenspan described the





**AT A TIME WHEN THE UNITED STATES IS GRAPPLING WITH THE PERNICIOUS EFFECTS OF EVER-WIDENING WEALTH INEQUALITY, OGDEN HAS BECOME AN UNLIKELY BEACON OF EGALITARIANISM.**

emergence of two different Americas—“fundamentally, two separate types of economy”—one in which the wealthy had made a “significant recovery” and the other in which the bulk of America’s labor force remained in a financial rut.

This year, Republican presidential candidate Jeb Bush called the growing divide “the defining issue of our time,” stepping up the rhetoric. “More Americans are stuck at their income levels than ever before,” he said. While the causes of the trend are the subject of endless debates, the statistics don’t lie. Since 1979, real earnings have risen 17 percent, according to the Economic Policy Institute, a nonprofit, nonpartisan Washington think tank. Such slow growth makes it tough for most Americans to pay the bills, let alone accumulate any wealth.

Yet Americans turn on their TVs and watch U.S. Treasury Secretary

Jack Lew hailing the nation’s impressive economic growth, which he recently called one of the world’s only “bright spots.” That disconnect can be jarring, says Joseph Stiglitz, professor of economics at Columbia University and winner of the Nobel Prize for economics, because “for many, the middle-class lifestyle is no longer in reach.”

The consequences for society go beyond dollars and cents. While research on the interplay between economics and social patterns is still relatively new, says Stiglitz, he notes that it shows “more and more people are exhibiting patterns of social dysfunction”—delaying marriage, buying a home and having children; or raising a family as a single parent—behaviors, he says, that “used to be an attribute of families who were at or below the poverty line” and yet now are encompassing





**AMERICA'S 160,000 RICHEST FAMILIES MORE THAN TRIPLED THEIR SHARE OF THE NATION'S WEALTH, FROM 7 PERCENT IN 1978 TO 22 PERCENT IN 2012.**

**THE 99 PERCENT:** Four years ago, anger at income inequality inspired the Occupy Wall Street movement, which spread across the country but changed little.

anyone who's not wealthy.

Stiglitz says rising inequality is not so much the result of natural forces of capitalism but what he calls an “ersatz” capitalism in which a “predatory” few at the very top put more effort into “getting a larger slice of the country’s economic pie than into enlarging the size of the pie” for all.

Lest the ultra-wealthy think this won’t matter to them, recent research from Barry Cynamon and Steven Fazzari, released in conjunction with the Institute for New Economic Thinking, shows that rising income inequality may be the primary reason for the nation’s lethargic economic recovery. They point to a 17 percent drop in household demand, compared with pre-recession numbers.

On a global scale, inequality threatens to “set the fight against poverty back decades” by moving more riches into fewer hands, says the international anti-poverty agency Oxfam. Unless current trends change, Oxfam projects the richest 1 percent of the world’s population will own more than 50 percent of the world’s total wealth by 2016. This year, even Pope Francis spoke out to lament what he called “the economy of exclusion.”

### THE GREAT GATSBY CURVE

**IN A GROUNDBREAKING** study released by the National Bureau of Economic Research, Emmanuel Saez, professor of economics at the University of California, Berkeley, and the director of its Center for Equitable Growth, and Gabriel Zucman, assistant professor at the London School of Economics, pinpointed when U.S. wealth inequality

began its upward climb: 1978.

Sifting through tax records going back a full century—the only data consistently available on a long-run basis in the U.S.—Saez and Zucman found the growing wealth gap in the U.S. shouldn’t be attributed so much to the top 1 percent as to the top 0.1 percent—about 160,000 families with net assets above \$20 million. (The wealth gap and income inequality are inextricably linked, but they are not the same; this study defined wealth as the current market value of all assets owned by households after deducting debts.)

Although the average real growth rate of wealth per American family between 1986 and 2012 was 1.9 percent, that number was skewed by the nation’s richest 160,000, who saw their real wealth grow 5.3 percent per year from 1986 to 2012. By contrast, for the bottom 90 percent in the U.S., there was no wealth growth at all.

This is a sharp reversal of the prosperity trend that saw the bottom 90 percent of America’s earners go from holding 20 percent of the nation’s wealth in the 1920s to 35 percent in the mid-1980s, according to



Saez and Zucman. As of 2012, the bottom 90 percent had fallen back to holding just 23 percent.

Meanwhile, America's 160,000 richest families more than tripled their share of the nation's wealth, from 7 percent in 1978 to 22 percent in 2012, representing a level not seen since America's peak years of inequality 1916 and 1929. "It is a very concerning trend," says Marjorie Wood, senior economic policy associate with the Global Economy Project at the Institute for Policy Studies, a Washington think tank focusing on social justice issues in Washington. She likens the wealth gap to the coming of a second Gilded Age, but one that differs from the first in that much of today's accumulated wealth is not ostentatious. "In the past," she notes, "there were a lot more public protests because wealth back then was so much more visible."

The very notion of rising inequality is offensive to many Americans, because it counters the American dream and the widely held notion that we live in a land of equal opportunity. Yet it's a problem researchers in Washington have known about for years. In 2011—the year Greenspan acknowledged the emergence of two Americas—Miles Corak, professor of economics at the Graduate School of Public and International Affairs at the University of Ottawa, laid bare the troubling relationship between inequality and social mobility in his paper "Inequality From Generation to Generation," later dubbed by the White House "the Great Gatsby Curve."

Corak's research showed that the family an American child is born into greatly affects that child's future earnings. His international rankings of the countries with the worst intergenerational mobility included Chile, the U.K., Italy and the U.S. (in that order). Countries offering the best intergenerational mobility were Denmark, Norway, Finland and Canada. Countries falling somewhere in the middle were Spain, Japan, Germany and New Zealand. "There is a disconnect between how Americans see themselves and the way the economy and society actually function," he wrote. "Many Americans may hold the belief that hard work is what it takes to get ahead but, in actual fact, the playing field is a good deal stickier than it appears."

This year, Federal Reserve Chair Janet Yellen weighed in. "We know that families are the locus of both opportunities and barriers to economic mobility," she said, calling for careful study of the issue.

Yellen has taken a lot of heat from critics who contend the Fed should stay out of matters of income inequality, arguing it is too political. She fired back, stating, "Economic inequality has long been of interest within the Federal Reserve System" and is of increasing concern to Americans.

## 'GROTESQUE AND IMMORAL'

**UNFORTUNATELY**, there are no easy solutions. Top-down efforts to address the trend have not gotten very far. Experts such as America's Stiglitz, French economist Thomas Piketty and British scholar Anthony Atkinson have proposed shifting resources from the wealthy to the less wealthy through various mechanisms, from tinkering with estate taxes to creating an "inheritance for all," to publicly funded "universal

social safety nets," to guaranteeing public sector jobs at a minimum wage for the otherwise unemployed.

Writing in *The New York Review of Books*, Piketty this summer applauded Atkinson's suggestion in his recent tome *Inequality: What Can Be Done?* of returning to a more loophole-free, "progressive" tax system where the wealthy are uniformly asked to pay more and the working class less. "The spectacular lowering of top income tax rates has sharply contributed to the rise of inequality since the 1980s, without bringing adequate corresponding benefits to



**BEFORE AND AFTER:** Ogden's historic 25th Street shopping district was once a rundown shell, until the city started buying up property, refurbishing it and granting loans to new businesses.



Before



After

society at large," Piketty wrote. In America, at least, that shift won't be happening anytime soon. Indeed, Bush's tax plan proposes to lower the amount of tax top-earning Americans pay.

With another election cycle revving up



in the U.S., Americans are hearing the same bromides as in past seasons from presidential candidates of both parties. Democratic Party front-runner Hillary Clinton is trying to make fixing inequality a cornerstone of her campaign, observing that “the deck is still stacked in favor of those at the top.” Bush recently acknowledged, “If you’re born poor today, you’re more likely to stay poor.”

Vermont Senator Bernie Sanders, a longtime independent now running for the Democratic nomination, has been denouncing the nation’s wealth gap since Richard Nixon was in office, when he wrote that 2 percent of Americans held more than one-third of the nation’s wealth. Sanders stated, “A handful of people own almost everything...and almost everybody owns nothing.” That was in 1973. More recently, he has advocated a federal minimum wage of \$15 an hour by 2020 (right now, it’s just \$7.25), but other candidates have been slow to second that proposal.

The infighting and lack of consensus have been frustrating, even to the candidates. In September, Republican contender Donald Trump bashed Clinton for having a donor list catering more to the superrich than to ordinary Americans. Sanders vented on Twitter, “The skyrocketing level of income and wealth inequality is not only grotesque and immoral, it is economically unsustainable.”

If income inequality remains sky-high and the bottom 90 percent cannot start to accumulate wealth again (remember that their gains have been close to zero from 1986 to 2012), the resulting disparity will destroy decades of progress, warn Saez and Zucman. “That is to say, 10 or 20 years from now, all the gains in wealth democratization achieved



during the New Deal and the post-war decades could be lost,” they contend. “While the rich would be extremely rich, ordinary families would own next to nothing, with debts almost as high as their assets.”

All of which raises the fiendishly difficult question: What if the inequality problem is too big for any one leader—or team—to fix? Perhaps, rather than unpacking and debating its bottomless nuances, it might be helpful to examine a community, preferably of substantial size, that has already identified and successfully solved many of these problems.



**BUILDING A FUTURE:** Weber State University (above) and Ogden’s schools have made science, technology and math a priority as early as kindergarten, with a view to preparing young people for good jobs.

## WAITRESSES BUYING HOUSES

**FOR THE PURPOSES** of this article, *Newsweek* looked at the latest wealth data from the U.S. Census Bureau’s five-year American Community Survey for major metro areas with surrounding communities of at least 300,000 residents. The widest wealth gap in America, according to that data, can be found in three Connecticut cities: Bridgeport, Stamford and Norwalk—known as American hedge fund country for the crush of millionaires and billionaires settled in their environs, many of whom work in nearby Greenwich. Second place for widest wealth gap was Naples, Florida, which included the upscale Immokalee-Marco Island. The third covered the combined area of New York City plus Newark and Jersey City, New Jersey.

How does Ogden compare with Connecticut’s hedge fund country? The richest 20 percent of Ogden’s households hold around 40 percent of the city’s income. By contrast, in the metro area covering Bridgeport, Stamford and Norwalk, the richest 20 percent hold close to 60 percent of the income.

Ogden does not simply have the narrowest wealth gap; this middle-class oasis also offers many residents higher wages and a lower cost of living than the national average, with some of the lowest unemployment and best job growth numbers in the country. It’s the type of place most Americans had assumed disappeared in a cloud of cynicism somewhere between Studio 54 and Reaganomics.





**"IT TOOK US 50 YEARS  
TO FIGURE OUT THAT DOING  
NOTHING WAS A LOT RISKIER  
THAN DOING SOMETHING."**

Mark Muro, a senior fellow at the Brookings Institution and the director of its Metropolitan Policy Program, co-authored a report in June listing Ogden as one of "the hottest 15 metros for advanced industries," a city that has worked hard to attract jobs in high-growth sectors. In particular, Ogden's focus on technical jobs and vocational training for its nonuniversity graduates has made it a U.S. hub for science, technology, engineering and math (also known as STEM) jobs, Muro says.

While the number of university graduates in Ogden is less than half its adult population, the town has installed numerous STEM programs in its schools and single college, Weber State University, that match students and adults with high-tech employment opportunities—and technical training starts as early as kindergarten, says Terrence Bride, Ogden's business development manager. This leads to higher-paying jobs for graduates without the need for a four-year university degree, which means lower debt for graduates and ultimately a chance to accumulate wealth.

"I came here from California with my husband, who's an aerospace engineer," says Carrie Vondrus, who owns a retro clothing shop in Ogden's downtown. "The low cost of living allowed me to stay home and raise my kids, which we couldn't have done where we were living. Now my 25-year-old son just bought a five-bedroom house in town. He is a manager at Dick's Sporting Goods, and it's his first home. He and his girlfriend are paying for it by themselves."

Stories like this abound in Ogden, where the median age is 30 and even restaurant waitstaff are buying houses—for many, the first step toward accumulating wealth. While the city's median income is still

below the national average, at \$35,844, its growth is led by the high-tech job sector, which according to Brookings pays an average annual salary of \$60,580 a year.

Perhaps most significant, Ogden did not start out this way. Throughout the 1990s, the town was mired in seemingly intractable problems not unlike those facing the nation today: crumbling infrastructure; a lack of stable jobs with good wages and benefits; a shortage of affordable, quality housing and schools; and an increasingly frustrated population that, nonetheless, was deathly afraid of change.

"It took us 50 years to figure out that doing nothing was a lot riskier than doing something," Christopulos, the city's economic development director, tells *Newsweek*. "For a long time, nobody could agree on what to do. We found out the price of doing nothing was the loss of millions and millions of dollars in tax revenue and decay. It wasn't until we hit rock bottom that we finally got the consensus we needed to change."

Until the 1960s, Ogden was a thriving railroad town, the junction of the once-warring Central Pacific and Union Pacific railroads,





**“A HANDFUL OF PEOPLE OWN ALMOST EVERYTHING... AND ALMOST EVERYBODY OWNS NOTHING.”**

which reached a détente in 1869 with the planting of the golden spike that joined the two lines at Promontory Summit, just northwest of Ogden, to create the nation’s first transcontinental railroad. So great was Ogden’s wealth at the turn of the century, it boasted “more millionaires per capita than any city in the country,” according to Mayor Mike Caldwell.

But with the rise of the interstate and the decline of the railroads, Ogden lost its status as northern Utah’s primary commercial hub—and its wealthy denizens fled. Between 1960 and 1990, Ogden hemorrhaged thousands of people and millions of dollars of business. By the late 1990s, the city was in dire straits, its once-resplendent downtown in a shambles and its 25th Street shopping district vacant.

The turnaround began in 2002, with the election of 29-year-old Matthew Godfrey, at the time one of the youngest mayors in the U.S., who spent the next decade tearing down and rebuilding the city’s downtown—often over protests—and courting businesses to move to Ogden, which he tried to rebrand as a mecca for high-tech talent. “I was young, and we had a really ambitious agenda, and I don’t think that many people thought we could pull it off,” he says.

“At first, there were no takers. Our tech industry was virtually nonexistent. We were just this dirty, run-down old railroad town,” says Godfrey, now 45. “Businesses would come in, look around and then relocate to Salt Lake City or somewhere else. So we gave up on the high-tech firms and started to recruit outdoors companies full bore.

**+ SOMETHING TO LIVE FOR:** Ogden has used its position at the foot of the mountains to attract outdoor sports businesses, and the downtown area hosts 650 festivals, art shows and other events each year.

And when they started to come in around 2008, suddenly the high-tech firms were interested. Suddenly, we were this hip, cool outdoor-recreation town.”

Meanwhile, Christopulos, who worked under both Godfrey and his successor, Caldwell, had begun buying back polluted land, industrial buildings and trashed neighborhoods, cobbling funds together wherever the city could. “My team and I created our own kind of Skunk Works to bring together whatever we needed to do a project, from federal and state grants to financing to contractors to environmental remediation,” he says.

By 2007, their efforts to attract commercial tenants to Ogden’s newly renovated historic buildings started to pay off, generating millions of dollars in revenue for the town in the form of tax increments, property leases



and sales taxes, which it reinvested in more projects and improvements. To date, the town has generated more than \$4 billion of new tax revenue.

Critical to the master plan was a vibrant downtown. After rotting for decades, Ogden's historic 25th Street, where Al Capone used to bootleg liquor, was recently listed as one of the most beautiful thoroughfares in America for its amphitheater, festivals and street art. (The town's planning manager, Christy McBride, says the downtown, now 95 percent occupied, hosts around 650 events a year, attracting tens of thousands.)

Other than Albuquerque, New Mexico, Ogden was the only major metro area in the West to post job growth in 2009, while the recession was still raging throughout the rest of the country. It was one of the first cities in the nation to return to its prerecession peak output that same year. And before the recession, Ogden's high-tech job sector had grown 12.6 percent from 2002 to 2007.

Today, Ogden hosts a diverse group of expanding businesses, with advanced industries representing around 26,500 jobs, according to Brookings. Its employers include Northrop Grumman, Rossignol, Universal Cycles, Mercury Wheels, U.S. Foods, Amer Sports, Cornerstone Research, Home Depot, Hart Skis, ConAgra Foods and Hershey's.

A sign in front of Ogden's highest peak proclaims in great, arching letters: "It pays to live in Ogden."

### A SOLUTION BEYOND POLITICS

**WHILE EVERY TOWN** is different, and there are limits to how even the best growth strategies might be applied elsewhere, what happened in Ogden can happen elsewhere. Professor Raj Chetty of Stanford University, one of the world's foremost economists and currently a visiting professor at Harvard University, says while policy solutions at the state or federal level can offer a better overall environment for economic growth (by improving access to college, for instance), a person's hometown can have the greatest impact on chances for upward mobility.

Parsing big data from cities across the United States with a team of other researchers as part of the Equality of Opportunity Project, Chetty found that the city where a child is born affects his or her chances for upward mobility in life enormously. According to the project's data, released earlier this year, a child from a lower-income family in Ogden would make \$2,440, or 9 percent, more annually by age 26 than the national average. The same data also show that Weber County, where Ogden is located, offers greater income mobility than 76 percent of the counties in the U.S. "The local level is of significant interest, because it's an area where I think there might be more tractable policy solutions," Chetty says. "Federal or state policy is unlikely to be the entire solution, because it seems like the problems are different in different places and require a more tailored approach."

By working as a community to increase overall prosperity, Ogden has moved past the economists' discussion about how to redistribute existing wealth to focus on attracting new wealth by cultivating businesses that offer higher labor income to its residents and enlarging the "pie" described by Stiglitz.

Higher labor income, plus a lower cost of living, leads to a greater savings rate and wealth accumulation. Perhaps this period is not the end of the American dream, says Christopulos, but only marks its redefining. "From a philosophical standpoint, we would just as soon find a way to

create more overall wealth and raise the level of all income," he says. "That is more related to economic opportunity than a gap between the rich and the poor."

Surveying Ogden's downtown, Christopulos glowers at another row of houses he'd like to gut, refurbish and release back into the neighborhood. "We try to use econom-



ics to try to figure out how to effect social change, but it is hard," he says. "Unlike Uncle Sam, I cannot increase the money supply. We don't have those kinds of control elements. Each situation is different and has so many parts. There is no one-size-fits-all solution."

Whatever the solution is for the country, Christopulos says he's pretty sure it will have nothing to do with politics—and especially not with partisanship masking the real divide: financial inequality.

"I've been a Republican and I've been a Democrat," Christopulos says. "Now I'm a communitarian." **N**

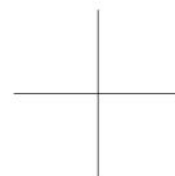








NEW WORLD



AUTISM

INNOVATION

SPACE

ENVIRONMENT

SUICIDE

MEDICINE

GOOD SCIENCE

## GRAY MATTER'S ANATOMY

NASA's tiny 3-D camera is designed to explore the farthest reaches of your brain

**BONE DEEP:** MRI scans, like this one, are well and good for diagnoses. But to actually operate on a human brain, you need to work in a tight space just under the skull. NASA's new minicam will help.

**SURGERY** on someone's gray matter is a delicate operation to say the least. Since there is little space between the skull and the brain, it's tough for a surgeon to get in between them to see what she's doing. NASA might have a solution: It is developing a microscopic camera that will allow surgeons to peek inside your head, providing a better view of the intricacies of the tissue, and hopefully lead to more effective, safer procedures.

The camera—code-named “MARVEL,” for Multi-Angle Rear-Viewing Endoscopic Tool—measures just 0.2 inches in diameter and about 0.6 inches long. MARVEL will be attached to an endoscope, a device that examines the interior of the body, that has a bendable neck that can move in a 120-degree arc. To get MARVEL inside the patient's head, a small incision is made in the eyebrow, then a tiny hole is cut in the skull through which the endoscope is fed.

MARVEL also comes with innovative 3-D photo tech. The camera is able to generate 3-D images

using two apertures that sit behind each other (an arrangement that keeps MARVEL tiny). At any given time, one is open and receiving the image, while the other is closed; they alternate every millisecond. To create the 3-D image, the pictures from both apertures are merged. This is done in real time, at 60 frames per second.

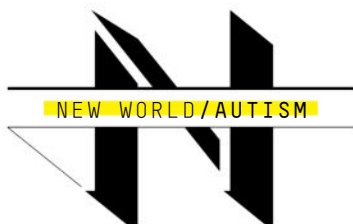
Currently, when doctors need to excise a brain tumor or insert a deep brain stimulator to treat Parkinson's disease, they rely on a craniotomy, a procedure in which a surgeon removes a large part of the patient's skull. Using MARVEL would allow surgeons to bypass this highly expensive and dangerous procedure. Right now, NASA only has a lab prototype; the next step is to meet FDA requirements. It might be a while before the mini camera makes its way to your brain surgeon's operating theater. Down the road, there's another place MARVEL may end up: deep space. Imagine it attached to NASA's next orbital robot, exploring brand-new worlds in stunning 3-D. **N**

BY

STEVE SMITH

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## AUTISM'S NEXT WAVE

A new hope for autism is applying magnetic stimulation to temporarily alter the electrical activity of patients' brains

**WILL ROBESON** bounces into the neuroscience lab at the University of Louisville in Kentucky, familiarly calling out to each staff member. He makes his way to a black leather recliner next to a suitcase-size piece of equipment, with controls and a power supply. Above his head, a piece of plastic shaped like a figure eight contains a coil capable of generating a powerful magnetic field. Will, a 12-year-old boy with autism, is about to undergo transcranial magnetic stimulation (TMS); the magnetic field will temporarily alter the electrical activity of his brain. He has done this more than 40 times in the past four years. The goal of the treatment is to retune the way his brain cells communicate and help him better connect to the world.

Over time, he and Estate Sokhadze, the scientist who expertly manipulates the machine, have established a comforting routine. Sokhadze first places electrodes on Will's hands to measure the boy's breathing and pulse. He then puts a dark blue swim cap over Will's head, the better to see the outlines of the boy's cranium. Picking up the coil as if it were a wand, Sokhadze holds it just above the left side of Will's head, an inch behind where his red bangs peek out from under the cap. As the machine begins emitting loud clicks, Will closes his eyes and counts along with each click, "1, 2, 3, 4..." until he reaches 20 and the clicks stop. After repeating the process several times in the same spot, Sokhadze shifts the coil

to the right side of Will's head.

Although the procedure looks as if it could be overwhelming, Will says, "It feels happy." And it seems that the treatments have gradually eased some of his autism symptoms. When Will first came to the lab at age 8, he had a limited vocabulary. He flapped his arms repeatedly and refused to ride in the building's elevators. "For all practical purposes, he was in sort of a fog," says his grandfather, Tom Robeson, who, together with his wife, Nancy, picks Will up from his parents' home and takes him to the sessions, more than an hour's drive away.

Initially, Will came in every week for 18 weeks as part of a study testing TMS as a treatment for autism in the lab of Manuel Casanova, a neurologist at the University of Louisville (and now at the University of South Carolina in Greenville) with whom Sokhadze collaborates. In the years since, Will has returned to the Louisville lab periodically for "booster" sessions. According to clinical evaluations, the treatments have slightly alleviated Will's hyperactivity and repetitive behaviors. Although he still cannot hold a meaningful conversation, his grandparents say he has become much more interested in other people and is better able to control his behavior at school.

Signs of progress in a few people like Will have fostered hopes that TMS will become a routine therapy for autism, a disorder with no reliable biological treatments. Families desperate for

BY  
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**BALANCING ACT:** The current thinking is that autism might have something to do with an imbalance between neuronal excitation and inhibition—and that TMS might be able to create harmony in the brain.

help are understandably eager to see TMS more widely adopted, although the evidence for TMS's effectiveness is still thin. "There's tremendous excitement at the potential to have something that's non-invasive, non-drug-based, with potentially fewer side effects," says Michael Platt, a neurobiologist at the University of Pennsylvania in Philadelphia who is studying the effects of TMS in monkeys. "But the fact of the matter is we don't understand very much about how it works." Of the studies that specifically assessed TMS as a therapy, only one meets the highest standards for research of this type. Overall, the results have been mixed: Some people with autism benefit; others do not.

Still, some for-profit clinics have already begun using TMS to treat people who have au-

tism. Others with autism are experimenting with simpler forms of brain stimulation on their own. "It's worrisome," says Lindsay Oberman, an autism researcher at Bradley Hospital in Providence, Rhode Island. "You could make somebody worse if you don't know what you're doing."

## ELECTRIC POSSIBILITY

In ancient times, the Romans treated headaches and other pain by immersing themselves in pools replete with electric torpedo fish. In the late 1700s, Alessandro Volta channeled the electricity generated by his newly invented battery to his muscles, eyes and ears. By the 20th century, scientists had learned that neurons communicate via electrical signals. One result of that knowledge was elec-

**"YOU COULD MAKE SOMEBODY WORSE IF YOU DON'T KNOW WHAT YOU'RE DOING."**

troconvulsive therapy, developed in 1938 to treat severe depression. But electroconvulsive therapy is used less often than it once was, because of its frightening reputation.

In electroconvulsive therapy, electrodes are placed directly on the scalp to trigger a seizure. TMS is different. It can target one brain region and allows for more precise alterations of brain function. Unlike electroconvulsive therapy, TMS is not painful and doesn't appear to cause amnesia or cognitive problems. The side effects seem limited to headaches and some muscular aches and pains, though a few people have had seizures during therapy.

In most brains, neurons engage in a perpetual balancing act between excitation and inhibition in response to an endless flow of stimulation. In autism, as in other neurological disorders, this balance seems to go awry. The thinking is that TMS could correct that imbalance.

When a powerful magnet generates a magnetic field near the head, the field travels a few centimeters through the scalp and skull, changing the electrical activity of neurons in those locations. The result is a temporary reorganization in the way brain cells communicate with one another.

TMS can stimulate neuron activity or change the signaling patterns of cells that are already active. Given its capacity to do both non-invasively,





from the start it offered the promise of a powerful treatment for a range of neuropsychiatric disorders that seem to involve dysfunctions in brain circuits, such as depression, schizophrenia, epilepsy and obsessive-compulsive disorder.

In the mid-1990s, researchers began treating depression with TMS, administering treatment in regular sessions over weeks or months. In 2007, the U.S. Food and Drug Administration approved it for treating depression in people who don't respond to medication and talk therapy. It has since been used to also treat chronic pain and to aid in recovery from stroke.

#### VIVID CHANGES

At its best, TMS can produce dramatic changes, although they don't necessarily last. In 2008, John Elder Robison, a well-known speaker and writer who has autism, enrolled in a TMS study led by Oberman and neurologist Alvaro Pascual-Leone at Beth Israel Deaconess Medical Center in Boston. Before that study, Robison says, he was blind to other people's emotions. "It's as if you knew the world was black and white, but people talked about reds and blues and greens, and eventually you just became angry because you thought people were putting you on," he says. "And then suddenly you go into the lab, a scientist does something to you, and you walk out and see all the colors in the world. And you realize: It's real." The effect stayed with him only a day or two, but Robison said the experience was "life-changing."

However, Oberman and other scientists say they worry people with autism will extrapolate too much from Robison's experience. No one else Oberman has worked with has undergone as dramatic a change as Robison did, she says. For example, 17-year-old Nick (his real name has been changed for privacy reasons) was diagnosed with autism when he was in seventh grade. When he was 14, Nick joined a study in Oberman's lab, and after one session of TMS, Kim Hollingsworth Taylor, Nick's mother, saw significant differences in the way he carried himself.

"He turned his head and upper body to me as we talked, he did less toe-walking, and he walked an appropriate distance from me," she says. Nevertheless, in their evaluations, the research team found only one small behavioral change.

The effects lasted just a few days but were encouraging enough that Nick's father took him back to Oberman's lab for several more off-label TMS treatments, culminating in a 10-week period in 2013 during which he received TMS twice a week. "It seemed like the stimulation turned down the static for him," says Taylor. "I told him how different he was, and he said, 'It's like there's more of me here now.'" For four months, she says, nearly all of Nick's autism traits went away.

Flush with success, Taylor asked Oberman why TMS isn't more widely available. When Oberman explained that the research is still in an early stage, Taylor, who has a background in medical technology, created a small nonprofit organization to help bring researchers together, raise funds for TMS research and provide information about the clinical use of TMS. Taylor says she dreams of the day when TMS is a proven treatment, widely available to anyone who walks into a clinic.

But in the past year, all of the benefits Nick experienced from TMS have disappeared. His repetitive behaviors, obsessive-compulsive disorder and social isolation have all returned.

**"SUDDENLY YOU GO INTO THE LAB, A SCIENTIST DOES SOMETHING TO YOU, AND YOU WALK OUT AND SEE ALL THE COLORS IN THE WORLD."**

"He is truly back to being stuck," Taylor says. What's more, Nick refuses to have anything to do with the treatment. "I'm in the painful position of working hard to push an agenda while my son gets worse and worse since he never wants any ever again," she says.

#### SEARCHING FOR A PERFECT SHAM

Among scientists, even the most gung-ho TMS advocates admit that the research has severe limitations. For example, Casanova's studies, which have involved nearly 200 people with autism, found improvements in behavior and in some forms of cognitive processing, but none were fully randomized or controlled for a placebo effect.



To account for the placebo effect, researchers would need to create a sham TMS, but that has proved to be tricky. The electrical current causes twitching in the muscles of the face and hands, which so far has been difficult to simulate. Depending on the part of the brain that is being targeted, the sensation can be unpleasant: "It feels like someone is snapping a rubber band against your head," says Oberman. In other words, anyone who has experienced TMS will find the experience unmistakable.

The only rigorously controlled trial of TMS took place at Australia's Deakin University, where cognitive neuroscientist Peter Enticott and his colleagues were able to fit a helmet with a sham TMS device that clicks and vibrates without delivering a magnetic field. It isn't a perfect solution, but the 28 participants in the trial didn't know whether they received TMS—and neither did the researchers, until the trial was over.

Enticott's team targeted the dorsomedial prefrontal cortex, thought to be involved in the ability to recognize others' emotions and beliefs, something people who have autism struggle with. The 15 participants who got real TMS showed a small but statistically significant improvement in social relating at the one-month mark, as well as

a small dip in social anxiety, compared with the 13 participants who received sham treatment. It was a promising result, but, Enticott stresses, "we're nowhere near being able to say that TMS is going to be an effective treatment for autism."

TMS generates 1 tesla of power, as much as a magnetic resonance imaging machine, so the treatment should be administered only by skilled professionals in a lab. Because it is still an experimental approach, anyone trying it ought to do so only as part of a research study. That hasn't stopped the proliferation of for-profit TMS labs. "People are paying tens of thousands of dollars for this completely unvalidated treatment," says Enticott. "It's obscene."

Buoyed by TMS's promise, many people with autism have also begun experimenting with brain stimulation on their own—a testament to the lack of therapies available for autism. Do-it-yourself treatment uses an entirely different method, transcranial direct current stimulation, or tDCS, to try to change brain function. Electrodes placed on the forehead deliver a weak current—usually between 1 and 2 milliamps—to the brain. This is almost certainly too weak to have the same effect on neurons' activity as TMS does, says Oberman. Still, she is launching a study of the method just to be sure.

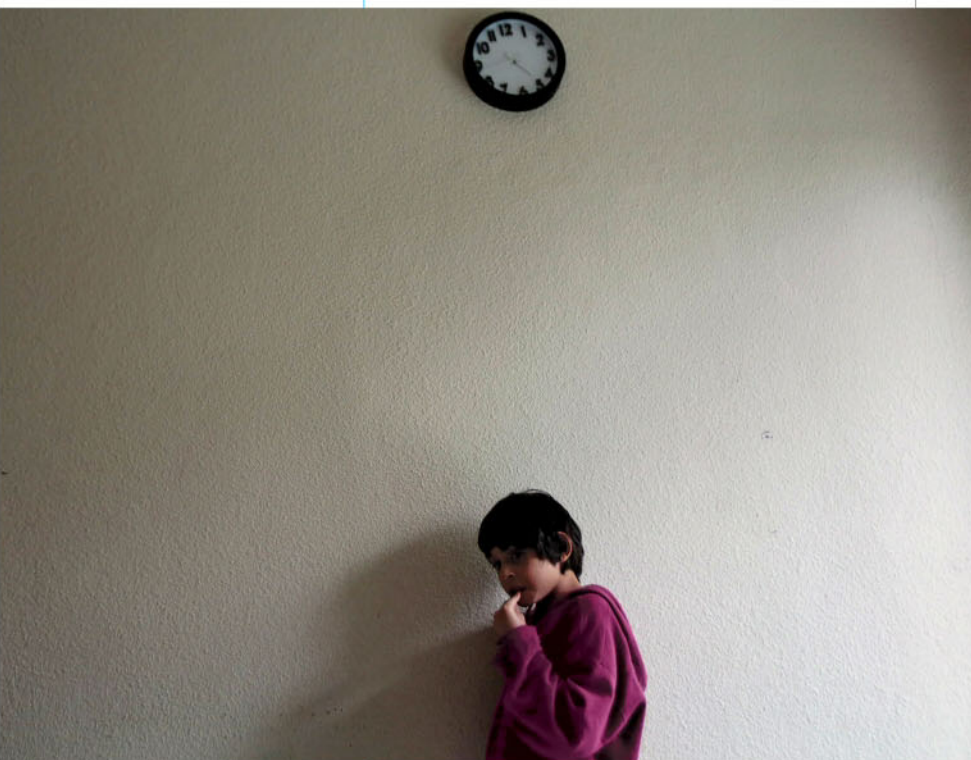
TMS's effectiveness with autism may well turn out to mirror what's been learned in depression: The treatment works only for some people and usually requires maintenance sessions. By using TMS to study the brains of people with autism, researchers may be able to predict who is most likely to benefit from the technique.

So far, Casanova says he has found it to be most effective in people with autism who have an intelligence quotient above 70. Sadly, that means he hasn't been able to help his grandson, who was diagnosed with severe autism.

Casanova's work does seem to have helped Will, who finished sixth grade this spring in a mainstream school with a full-time aide. Will's grandfather says the past year has been "a perfect storm" of progress, with Will more attuned to other people and able to do things he used to fear. The last time Will left Casanova's lab, he was nearly as excited as when he'd arrived. He was looking forward to a treat that previously would have been unimaginable: riding downstairs in the elevator. **N**

**RAISING HOPE:** Families desperate for help are eager to see TMS more widely adopted, although the evidence for the procedure's effectiveness in treating autistic children is still thin.

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JORGE DAN LOPEZ/REUTERS

This article originally appeared on Spectrum (SpectrumNews.org) on September 23, 2015.





## SOLVING SUICIDE

Most fatal gunshot wounds in the U.S. are self-inflicted, and there's an easy way to save thousands of lives

ON JUNE 17, after sitting quietly through a prayer service at Emanuel African Methodist Episcopal Church in Charleston, South Carolina, 21-year-old Dylann Roof allegedly opened fire on parishioners with a .45-caliber handgun, killing nine. It was another devastating rampage—one that would be followed by shootings in Chattanooga, Tennessee; Lafayette, Louisiana; and Moneta, Virginia—in what has begun to feel like a grievous and regular ritual.

These types of catastrophic events can warp our view of what gun violence in the U.S. really looks like. The five deadliest U.S. mass shootings of the 21st century—Virginia Tech, Sandy Hook, Fort Hood, Binghamton and the Washington Navy Yard—resulted in 101 deaths combined. In 2012 (the most recent year for which there is solid data), 32,288 people died from gunshot wounds in the United States. According to research published this year in the *Annual Review of Public Health*, suicides accounted for 64 percent of those deaths. We may have cut down murders in this country over the past two decades, but gun violence has not abated so much as it has evolved into a more insidious form.

The media, however, miss the trend entirely. In 2013, Slate and Twitter user @GunDeaths collaborated on the Gun Deaths Project, an ambitious (though short-lived) attempt to track down every news report of fatal gun violence in America. Perhaps the project's most trenchant discovery

came not from what they found, but what they didn't. By the end of the year, Slate realized it was capturing only one-third of all gun deaths; it had recorded around 11,400 deaths, while the U.S. Centers for Disease Control and Prevention reports roughly 32,000 every year. The missing 20,000 deaths? Almost all suicides.

There's a culture of euphemism in obituaries involving gun suicide; "died suddenly," "died at home" and "passed unexpectedly" are all used to cover an ugly fact. This systemic aversion to the topic has made it difficult for the general population to understand how suicide and gun ownership overlap, and enables firearm suicide to flourish in darkness.

For example, it's rarely something people consider when contemplating why someone took his own life; we don't say "he owned a gun" the way we cite things like clinical depression, financial woes and drug problems—but we probably should. Evidence suggests guns are not just a means of acting on a hard and fast decision to kill oneself; they are a risk factor that should be considered alongside mental illness, substance abuse and family history.

David Hemenway, a professor of health policy and the director of the Harvard Injury Control Research Center (HICRC), has studied firearm violence and the relationship between guns and suicide in the U.S. for 15 years. In that time, he has amassed an abundance of statistical evidence

BY  
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**GUN VIOLENCE  
COMES HOME:**  
Bonnie and Danny  
McAlpin's son,  
Rusty, an Iraq  
War veteran, com-  
mitted suicide with  
the family's .357  
Magnum handgun.  
Gun suicide is  
particularly com-  
mon among vets.

indicating that access to guns increases the chances of suicide. "Why does Arizona have more suicides than Massachusetts?" he asks. "Is it mental health, is it diet, or is it alcohol or smoking, or is it depression?" It's none of those. The one thing that explains different rates of suicide across regions, states and even cities is simple: guns.

In a study published in 2008 in the *New England Journal of Medicine*, Hemenway and his co-authors found that men were 3.7 times more likely to die by gun suicide in the 15 states with the highest rates of gun ownership compared to the six states with the lowest. Women in the states with the highest

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**OVERDOSING ON DRUGS  
HAS A COMPLETION RATE  
OF JUST 3 PERCENT. GUN  
SUICIDE HAS A COMPLETION  
RATE OF 85 PERCENT.**

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gun ownership were 7.9 times more likely to kill themselves with a firearm. And in a 2014 paper published in the *International Review of Law and Economics*, Justin Briggs and Alexander Tabarrok found that for every 1 percentage point



increase in household gun ownership, suicide rates go up between 0.5 and 0.9 percent. The Briggs-Tabarrok effect, as it became known, starkly illustrates how in America having more guns leads to more suicides.

One of the great misconceptions about suicide attempters is that, after considerable deliberation, they have reached a point of no return. In fact, in many cases the complete opposite is true. In an oft-cited 2001 study published in *Suicide & Life-Threatening Behavior*, 153 survivors of suicide attempts were asked when they had made the decision to kill themselves. Seventy percent of the responders said they had decided to kill themselves within an hour of the actual attempt; 24 percent said within less than five minutes. This phenomenon is known as suicide impulsivity, and it seems to find its perfect match in firearms.

Shooting yourself does not entail the preparation of overdosing on pills or the grisly persistence of slitting your wrists. It is immediate and requires zero protracted thought: the perfect mechanism for the instant fulfillment of what might otherwise be a fleeting inclination.

The problem is that firearms are frighteningly lethal. The most common method of attempting suicide, overdosing on drugs, has a completion rate of just 3 percent (in other words, 97 percent of attempters survive). Gun suicide, by comparison, has a completion rate of 85 percent. This is surely gun violence at its most virulent—Berettas and Glock 17s crystallizing passing impulses into something horrifically permanent—and yet it is rarely, if ever, acknowledged as a gun issue.

For years, the HICRC has been trying to change this through its “Means Matter” campaign, a

**WEAPON OF MY DESTRUCTION:** Most suicidal thoughts are compulsions that pass quickly, but the ready access to guns in the U.S. means it's easy for depressed people to act on those impulses.

JASON COHN/REUTERS





suicide prevention initiative focused on what is called “means restriction.” The idea is that if we can restrict the availability of lethal means for individuals showing warning signs of suicide, we can stymie impulsive attempters until the desire passes, saving lives.

There are convincing precedents. One is what suicide prevention experts refer to as the “British coal-gas story.” In the 1950s, domestic gas in the United Kingdom contained high levels of carbon monoxide, and self-administered gas inhalation poisoning was the leading means of suicide in the country. By the end of the decade, carbon monoxide poisoning accounted for roughly 2,500 suicides a year, slightly under half the nation’s total. In the 1960s, the British government undertook the detoxification of domestic gas, replacing the coal-derived gas high in carbon monoxide with nontoxic natural gas. By the early 1970s, the country’s suicide rate had dropped by almost a third.

Even more directly relevant is the success of an Israeli Defense Forces policy change that went into effect in 2006. That year, in an effort to prevent suicides in the military—90 percent of which occurred with firearms, often when soldiers were on weekend leave—the military didn’t let soldiers take their firearms off base on weekends. The suicide rate fell by 40 percent.

Despite those impressive results, codifying some form of means restriction into law in the U.S. seems impossible. Here’s where politics enters the fray. Firearm suicide by its very nature is a confluence of two social issues—gun rights and suicide—that are most often discussed and understood in isolation, the former a polarizing political wedge calcified along party lines, and the latter typically interpreted in the context of mental health and psychiatric illness.

Truly substantive means restriction—imposing significantly more stringent background checks on handguns, for example—would require a level of political consensus that is just not possible in a U.S. where Second Amendment furor is as strong as ever. Even small compromises between gun owners and activists are fought over with vehemence. Take trigger locks, for example, the small metal devices that clamp around a gun’s trigger. Those fighting for means restriction argue that by legally requiring guns to be stored in a locked container or secured with a trigger lock, you could create enough of an impediment to gun access that it would significantly cut down on suicide rates—all without actually taking people’s guns away. But Massachusetts is the only state with such a legal requirement, and in 2008’s *District*



of *Columbia v. Heller*, the Supreme Court struck down a portion of the Firearms Control Regulations Act that required all firearms in Washington, D.C.—the city with some of the strictest gun laws in the country—to be kept unloaded or trigger locked, deeming it a violation of the Second Amendment.

The fight over trigger locks might seem petty, but the reality is that even incremental limitations on gun access could have dramatic effects on suicide rates. That’s because people can and do usually overcome the desire to kill themselves.

Dese’Rae L. Stage, 32, a photographer and writer who lives in Philadelphia, is one such survivor. Trapped in an abusive relationship, one night in 2006, Stage says she “lost it.” After a desperate call to her girlfriend was coldly rebuffed, “I just decided that that was it.” She took enough wine and pills to end her life, but her girlfriend alerted the police, who barged into her apartment. They took her to the emergency room, where she was treated and released three hours later.

Today, Stage is an outspoken advocate for suicide attempters as founder of the Live Through

## WHEN SOLDIERS LOST ACCESS TO THEIR GUNS, THEIR SUICIDE RATE WAS CUT BY 40 PERCENT.

This project, in which survivors tell their stories. After years working with survivors, she knows firsthand that if you can eliminate a suicidal person’s access to a gun, he or she will likely survive to tell the tale. “There’s this myth that someone who is suicidal, when impeded from an attempt, will just find another way,” she says. “Not true.” The data backs her up: Over 90 percent of all attempters never die by suicide. Limit access to bridges and guns, and that number will surely creep toward 100 in the U.S. **N**





AIDEN MONAGHAN/TWENTIETH CENTURY FOX

**+**  
**STARMAN:** Matt Damon as Mark Watney, the titular hero of Ridley Scott's latest film, *The Martian*, about an astronaut stranded on the red planet, struggling to survive for the four years it will take for help to arrive.





## DOWNTIME

TELEVISION

MOVIES

BOOKS

PHOTOGRAPHY

ART

MUSIC

### WHY NASA FAKED THE MARS LANDING

The new Ridley Scott film, *The Martian*, has more than just studio dollars at stake: Its success could decide the future of space exploration

**EIGHT MONTHS** ago I mashed my boots into 4,000 tons of dirt the color of a pumpkin spice latte. All around me stuff was being blown up, huge Lego-like vehicles teetered, and lights flashed brighter than the Las Vegas Strip. No, this wasn't Burning Man. I was on Mars.

From inside a mysterious black tent on my right, a voice boomed in a Yorkshire accent: "Tilt and backwards!" Earthlings in the dirt scrambled. "The tilt is too jerky. There's a jerk!"

This Mars was inside a dust-covered studio soundstage just outside Budapest, Hungary. The voice belonged to Ridley Scott, the British director of *Alien*, *Blade Runner* and *Gladiator* fame (and *Exodus: Gods and Kings* infamy). The orange dirt under my boots was the setting for his latest project, *The Martian*, a Matt Damon vehicle (and his vehicle is a Mars rover) scheduled for theatrical release October 2.

The 3-D epic, a Robinson Crusoe-esque survival tale set two or three decades in the future, is based on a 2011 online serial book turned best-selling novel by former AOL computer programmer Andy Weir. Mark Watney (Damon), an astronaut exploring the fourth rock from the sun, is impaled by an antenna during a dust storm and left for dead by his crew. Since he has no way to communicate with NASA and the next mission to Mars isn't due to arrive for four years, he must tough it out in a brutal environment with just 10 months' worth of supplies. Watney uses all of his scientific know-how to grow food, secure water and alert NASA that he's still alive. A resourceful mechanical engineer, he figures out a way to turn his pee into rocket fuel.

NASA might be the book's biggest fan, and Weir told *Wired* the agency views the project "as an opportunity to re-engage the public with space

BY  
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travel.” Last May, *The Washington Post* observed: “Andy Weir and his book *The Martian* may have saved NASA and the entire space program,” citing NASA’s struggle to get enough funding for Mars missions and the huge PR boost the novel gave the agency. NASA is hoping that the film adaptation of *The Martian* will be a Jupiter-sized smash and that its success will trigger renewed interest in space exploration, just as Stanley Kubrick’s 2001: *A Space Odyssey* did a half-century ago.

From 1959 to 1974—the space race era—NASA launched Mercury, Gemini, Apollo and Skylab—30 manned missions in 15 years. But since then, the agency hasn’t done much new exploration with humans, instead focusing on the International Space Station, a \$150 billion shared laboratory whose biggest recent contribution to science may have been allowing astronauts to eat lettuce that they grew while orbiting 200 miles above Earth.

According to a 2013 poll commissioned by Boeing and the nonprofit Explore Mars, 75 percent of Americans want to double NASA’s budget to ensure humans get to the red planet soon. NASA hopes to send people there by the 2030s and insists it could meet that goal if the Senate approves President Barack Obama’s proposed \$18.5 billion NASA budget for the 2016 fiscal year (a \$500 million increase from 2015).

At a National Press Club breakfast in September, retired NASA astronauts Colonel Terry Virts and Captain Mark Kelly said that to get to Mars, NASA needs to goose America’s interest in the planet. Getting to Mars is “more a question of political science than it is rocket science,” said Virts. In 1989, as part of his Space Exploration Initiative, President George H.W. Bush proposed a Mars mission as NASA’s long-term goal, but it was later abandoned. (During the next administration, Bill Clinton said human missions to Mars were too expensive and favored robotic probes instead.)

Bran Ferren, a former Disney Imagineering chief who has served on government advisory boards for science and technology, says NASA is “kind of lost at the moment” and “needs to be reinvented and reorganized and get on with this

notion of exploration.” He says, “It needs some vision and some passion. If that comes from a movie, then good.”

Can a film about a man on Mars really help a man get to Mars?

Weir, the author of *The Martian* who’s afraid of flying, may seem like an unlikely fount of space exploration wisdom. The book—essentially a 369-page math problem with a funny protagonist—began as a serial posted on his website. The novelist intended the book as a “technical book for technical people,” according to a statement. Eventually, it became a hit Amazon e-book. Random House came knocking. Then Hollywood. Drew Goddard (*The Cabin in the Woods*, *World War Z*) wrote the screenplay. As of September 14, it was the No. 1 trade fiction paperback on the *New York Times* best-seller list, where *The Martian* has sat for 45 consecutive weeks. The science that informs the story is surprisingly spot-on, considering that Weir says his research was conducted mostly on Google.

Ferren thinks the best kind of space mov-

## THE RESCUE OF WATNEY BY THE BIG-SCREEN NASA MIGHT RESUSCITATE THE FORTUNES OF THE REAL-WORLD NASA.

ies capture the public’s imagination with “the correct sensibility.” He was inspired by Kubrick’s 2001, a 1968 sci-fi classic plenty of astronauts, engineers and scientists cite as the launchpad for their careers. According to Bert Ulrich, NASA’s film and television liaison, because Kubrick and his team did extensive research with futurists and scientists and even IBM (at the time, the world’s largest computer company) to envision what space exploration might look like in the 21st century, they were able to predict a lot of what really came to be.

“Science fiction, especially in films, is continually an influence on real science,” Ulrich says. The mellow-voiced HAL could easily sub for iPhone’s Siri. The tablets used by the Jupiter mission look startlingly like iPads; the videophones foretold Skype; and the design of the space helmets, spacesuits and space stations was remarkably prescient.

The amazingly accurate futurism of 2001 may have spurred NASA to partner with Hollywood in the years since. Recent partnerships include



**SMALL STEPS:** NASA administrator Charles Bolden at the 2014 Humans to Mars Summit, a gathering which helps promote the improvement of technologies needed to make a Mars trip feasible.

*Gravity* (astronaut Cady Coleman called actress Sandra Bullock from the International Space Station to advise her on the part), *Tomorrowland* (Ulrich says NASA helped give director Brad Bird a “general visual context” for the retro-futuristic saga, drawing from 1960s NASA culture) and *Transformers: Dark of the Moon* (the film crew practically moved into Florida’s Kennedy Space Center for a week; director Michael Bay had worked with NASA on 1998’s *Armageddon*).

Yet NASA employees have spent more energy on *The Martian* than possibly on any other Hollywood collaboration. Staff from many NASA departments consulted on the film, from script

development through principal photography, and are now helping with marketing timed to the theatrical release. Ulrich says NASA’s collaboration on the design and technical details was “more intense” than on other films.

NASA seems to be squeezing every last proton out of the opportunity. Producer Mark Huffam says that he and Scott phoned NASA during their first production meeting and that he was “very pleased to learn that they knew the book and were enthusiastic about an open-door relationship and free exchange of ideas.”

The partnership began with Ulrich but soon expanded. Among the NASA staffers who served







as technical consultants on the script were James Green, the NASA director who works with the Obama administration and Congress on all robotic space travel—including the planning for future Mars missions—and Dave Lavery, a NASA exec who works with Mars rover missions like Curiosity and Opportunity, as well as the future unmanned mission Mars 2020. Rudi Schmidt, a scientist with the European Space Agency, was hired as an on-set technical adviser.

As a result, NASA left its mark all over the production. Screenwriter Goddard visited the NASA Jet Propulsion Laboratory, a federally funded center owned by the California Institute of Technology that develops robotics for the space agency. NASA also facilitated a meeting between costume designer Janty Yates and a curator of the Smithsonian Institution in Washington, D.C., which houses a fascinating collection of spacesuits dating back to the beginning of the Mercury program. Jessica Chastain, who plays a NASA space crew commander in *The Martian*, shadowed astronaut-chemist Tracy Caldwell Dyson, a mission specialist on space shuttle *Endeavour* Flight STS-118 in August 2007 and part of the Expedition 24 crew on the International Space Station in 2010. Actor Chiwetel Ejiofor, who plays a NASA director, says he spoke to staffers at NASA and the JPL to bone up for the role.

Production designer Arthur Max was given extensive tours of NASA facilities in Houston as well as the old Mercury and Apollo mission control centers and the current center that tracks the International Space Station. Max, who has worked with Scott since 1985, says he wouldn't have been able to create *The Martian* sets without NASA guiding him. More recently, NASA astronauts and administrators have appeared on panels at Comic-Con and at the JPL with Scott, Weir and Damon, often comparing *The Martian* to NASA's Mars plans.

The film's overlap with NASA's current goals is undeniable. Damon just signed up to have his name etched on a silicon chip on NASA's InSight lander that's scheduled to reach Mars a year from now. Both the NASA and 20th Century Fox Twitter handles are using the hashtag

#JourneyToMars to promote the fictional mission to the planet *and* the real potential one. In October, NASA will host a workshop to choose 10 possible landing sites on Mars for human missions. The workshop is intended to help connect the movie *The Martian* with actual Mars exploration progress.

The agency even allowed the movie's production team to film launches at Cape Canaveral—one of which was the December 2014 liftoff of the Orion, a spacecraft designed to take humans deep into space. The Orion has been touted as a first step toward Mars journeys. Lockheed Martin, which built the capsule, even sent Orion into orbit carrying a tribute to *The Martian*: the first sketch Scott made of Watney. It was featured on the cover page of the script, emblazoned with the astronaut's most Web-beloved quote (recently Tweeted by astrophysicist Neil deGrasse Tyson): "I'm going to science the shit out of this planet."

Of course, the best movies about Mars have been filmed by NASA's rovers, Spirit, Curiosity and Opportunity—the ultimate collaboration between science and art. Mars is the only plan-

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## "I'M GOING TO SCIENCE THE SHIT OUT OF THIS PLANET."

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et on which robots can become auteurs, and, in fact, actual rover footage has been incorporated into *The Martian*. In addition, lots of graphics, high-resolution satellite imagery and stock footage from NASA appear on control screens and monitors in the film.

"There have always been interesting collaborations between the sciences and the arts when it comes to space exploration," says Ferren. "Before you could go to space, people had to imagine what all the dots were in the sky at night. People get curious and tell stories. Human curiosity is the bond that unites art and science."

At the end of my day on the Budapest set, I watched Damon's character shimmying into a space capsule. "It's fun to play a character who's smarter than you," he says. "He gets to the right answers quicker than I would. I can't tell you how many times I've sat in my surface suit on-set thinking, I wouldn't last 20 minutes on Mars."

NASA is praying *The Martian* will last a lot longer than that in theaters. 



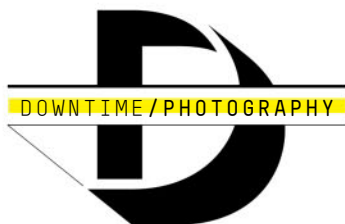
A close-up, high-contrast photograph of a gorilla's face, focusing on its eye and nose. The gorilla's fur is dark and textured, and its eye is a striking yellowish-brown color. The lighting is dramatic, highlighting the contours of its face.

# HELP SAVE THE 'WOW'

These giants of the animal kingdom need help. Despite their strength and cunning they're no match for a poacher's rifle. For 50 years WWF has been securing protected areas worldwide, but these aren't enough to stop the killing. To disrupt the sophisticated criminal gangs supplying animal parts to lucrative illegal markets, we are working with governments to toughen law enforcement. We're also working with consumers to reduce the demand for unlawful wildlife products. Help us look after the world where you live at [panda.org/50](https://panda.org/50)







## IMAGE PROBLEM

The instantly iconic photograph of a drowned 3-year-old refugee arrives at a time of soul-searching in the photojournalism world

**THE PHOTOGRAPH**, even though it was taken in the age of the Reaper drone, Instagram and ubiquitous smartphones that create and disseminate images in nanoseconds, arrived with the primitive force of an arrow to the chest. Turkish photojournalist Nilufer Demir's picture of 3-year-old Syrian refugee Aylan Kurdi lying facedown in the sand near the Turkish seaside resort of Bodrum, his outfit of red T-shirt, blue shorts and plastic shoes grotesquely well suited to the kind of carefree excursion a young boy might have been enjoying in such surroundings, swiftly became the defining image of Europe's refugee crisis.

When she came across Aylan's body around 6 a.m. on September 2, Demir "was petrified," she said in an interview with the Dogan News Agency, the organization she works for. "The only thing I could do was make his outcry heard."

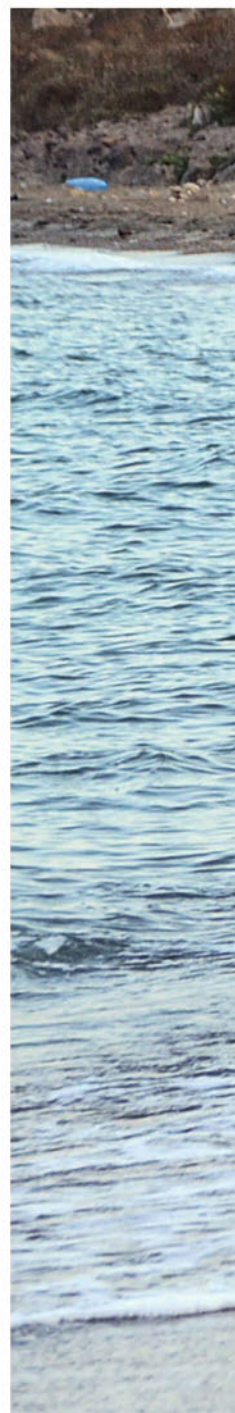
Why did this one image, out of the millions taken during the largest movement of refugees in Europe since World War II, prick the conscience of the continent? There's nothing remarkable about it in terms of technique or composition. Its power derives from its terrible normality: that affordable leisure-wear, the apparent peacefulness of the boy's body, the way his face is half-hidden.

The photograph of Aylan has one other key attribute—a sense of absolute authenticity. And in an era when manipulation, mainly

through the use of photo-editing software like Photoshop, is as widespread as the means of distributing images, that quality feels especially valuable. The photojournalism community has been increasingly embroiled in a controversy over what degree of digital editing is and is not permissible. For all of its awfulness, the image of Aylan facedown on the beach in Turkey felt to many photographers like an affirmation of their craft.

At the world's leading festival of photojournalism, Visa Pour L'Image, held in Perpignan, France, in early September, the industry's concerns about integrity and authenticity were the topic of many conversations. The event's director, Jean-François Leroy, refused to display any work by prizewinners from the World Press Photo contest because he believes the organization does not uphold the essential values of press photography. Lars Boering, director of the World Press Photo Contest, announced at the festival that his organization will draft a new code, formalizing its definition of staged images. The already animated debate was enlivened by the arrival, a week into the event, of the simple image of the drowned Aylan.

Although the debate about altering works of photojournalism has intensified in recent years, the manipulation of images that become iconic has a long history. Robert Capa, the most



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WITNESS:  
Photojournalist  
Nilufer Demir  
says: "The only  
thing I could do  
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outcry heard."



NILUFER DEMİR/DHA/AP





renowned photojournalist, took his most celebrated picture, usually known as “The Falling Soldier,” during a Spanish Civil War battle in Córdoba on September 5, 1936—or at least he claimed he did. Doubt persists concerning the picture’s authenticity: Some maintain it was staged, while some question whether he even took it. (Capa is no longer around to defend himself, having stepped on a land mine in Vietnam in 1954.)

Even images that have no such doubts hanging over them can provoke suspicion. Take, for example, Nick Ut’s photograph of a 9-year-old girl, Phan Thi Kim Phuc, fleeing down a road near South Vietnam’s Saigon in 1972, screaming in pain from napalm burns. Then-President Richard Nixon, when confronted with Ut’s seminal image, famously asked (the recording survives), “I wonder if that was fixed?”

Does it really matter if a picture is staged? Yes, according to award-winning American photographer Bud Lee, who died in June. One of Lee’s prizes was awarded for a 1967 cover shot for *Life* magazine, which became the most memorable image from that year’s Newark, New Jersey, riots: a 12-year-old African-American, Joe Bass Jr., lying in the street, shot twice by police.

“When I arrived at the riot,” Lee told me years after the event, “there were kids hanging round; they’d all been stealing. The storefronts were all trashed. I asked them if they’d go back, so it would look like they were looting again. As soon as they did, the cops arrived. The kids froze, all except one, Billy Furr. He panicked and ran. Joey Bass got hit but survived. Billy bled to death, in front of me.”

Lee told me that he acted instinctively. “I took my Leica and shot like crazy. I felt ashamed when I saw my pictures. I felt humiliated. All I wanted was a photograph. I didn’t want anybody to die.”

London-based photographic director and curator Cheryl Newman agrees with Lee that there is no room for manipulation in photojournalism. “Documentary work,” she says, “should be a truthful account of an event. It shouldn’t be tampered with in any way. It’s true that some images work compositionally as well as being powerful records of an event. Other images grab a collective consciousness, as was the case



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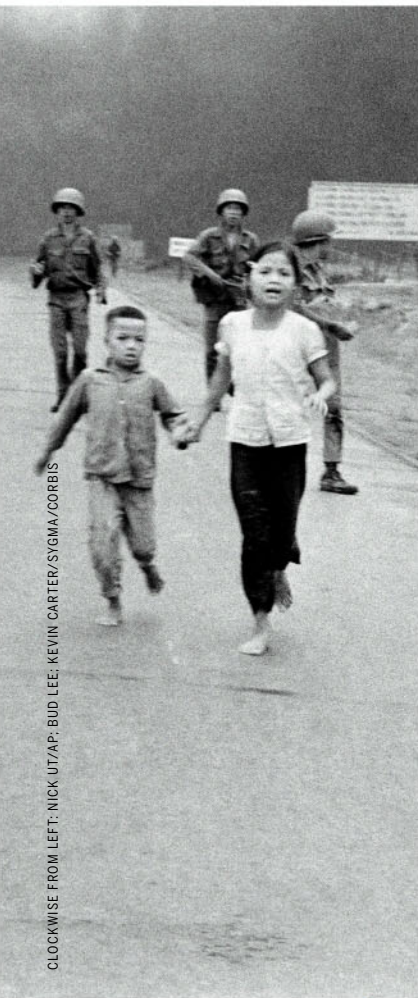
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with Aylan Kurdi. That picture could have been taken on a mobile phone. That doesn’t matter. What matters is the reality.”

The debate about manipulation has intensified in recent years, partly because of changes in the economic model of publishing—notably, the way the Internet has made it harder for even seasoned professionals to make a living. Online outlets generally pay lower fees than print publications and tend to rely on images distributed by agencies rather than hiring photographers themselves.

Photojournalism—even in its glamorous heyday, in the ’60s and ’70s—was never the most





**NEVER FORGOTTEN:**  
Left, Nick Ut's picture of  
9-year-old Kim Phuc in  
Vietnam; below, Bud Lee's  
image from the Newark  
riots of 1967; bottom,  
Kevin Carter's Pulitzer  
Prize-winning shot of a  
child in Sudan in 1993.



comfortable of occupations. Today, with the market dominated by the large agencies, the business is even harder. In the mid-1990s, I worked with a courageous American photographer named Carolina Salguero in the former

republic of Bophuthatswana, in South Africa. Salguero retired after shooting pictures of the terrorist attacks in New York on September 11, 2001. She now lives on a boat in Brooklyn, where she runs PortSide New York, an organization dedicated to improving the city's waterways.

"It was getting harder," she says. "I felt pressured to specialize in violence and genocide. The fees weren't great. Who else gets sent to the most dangerous places on earth and winds up with a tiny vertical credit?"

There are still hugely gifted professionals working in this challenging area, people like British photojournalist Marcus Bleasdale, who last year won the Robert Capa Gold Medal for his work in the Central African Republic, on a commission from Human Rights Watch. Increasingly, though, established photographers say they are making way for inexperienced, low-cost newcomers.

Some leading photojournalists have shifted their focus from the editorial desk to the gallery wall. Luc Delahaye, a highly respected French war photographer who worked in the field between the late 1980s and early 2000s, now produces panoramic tableaux intended for museum exhibition. Brighton, England-based former documentary photographer Simon Norfolk now exhibits conceptual work that draws on his material shot in Afghanistan, Iraq and Liberia. This line of work can be considerably more remunerative than regular photojournalism.

As photographers who once identified themselves primarily as journalists are positioning themselves more as artists, disputes have begun to surface over what differentiates art from legitimate reportage. In March, administrators of the traditionally respected World Press Photo Contest stripped an Italian, Giovanni Troilo, of a major award because they decided his work could not be defined as documentary photography. Troilo had photographed his cousin having sex with a woman in a car and used a flash positioned inside the car to illuminate the scene, a technique judged to constitute unacceptable manipulation.

As the debate continues over what—if any—degree of alteration of an image is acceptable in journalism, it seems unlikely there will be any shortage of tragedy for photographers to chronicle.

"The thing about a photograph like the one of Aylan Kurdi," Newman tells me, "is that it is impossible to forget once you've looked at it. Even if you shut your eyes immediately, it's too late. The image is with you. It will remain in your memory forever. And that," she adds, "is what gives photography the power to change events." **N**



# REWIND

20  
YEARS



OCTOBER 02, 1995

NEWSWEEK'S "PERISCOPE"  
SECTION ANALYZES BILL CLINTON'S  
RE-ELECTION PLANS

**“Though** Clinton isn’t yet in campaign mode, his political gurus of '92 and '96, James Carville and Richard Morris, met recently to discuss re-election strategy. An aide said they were 'cordial' but clearly staking out their turf, rather 'like two dogs pissing on each other’s trees.’”



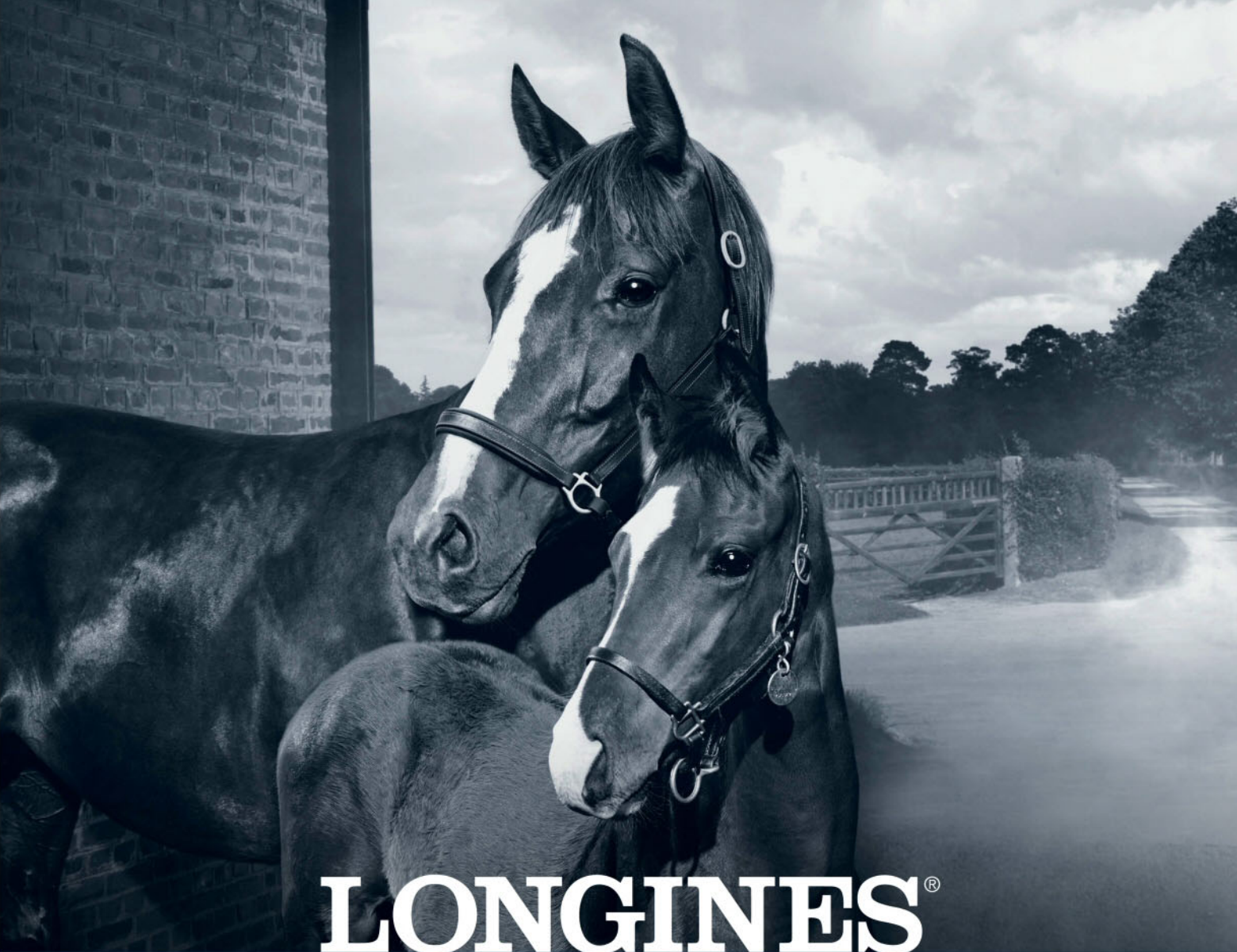


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